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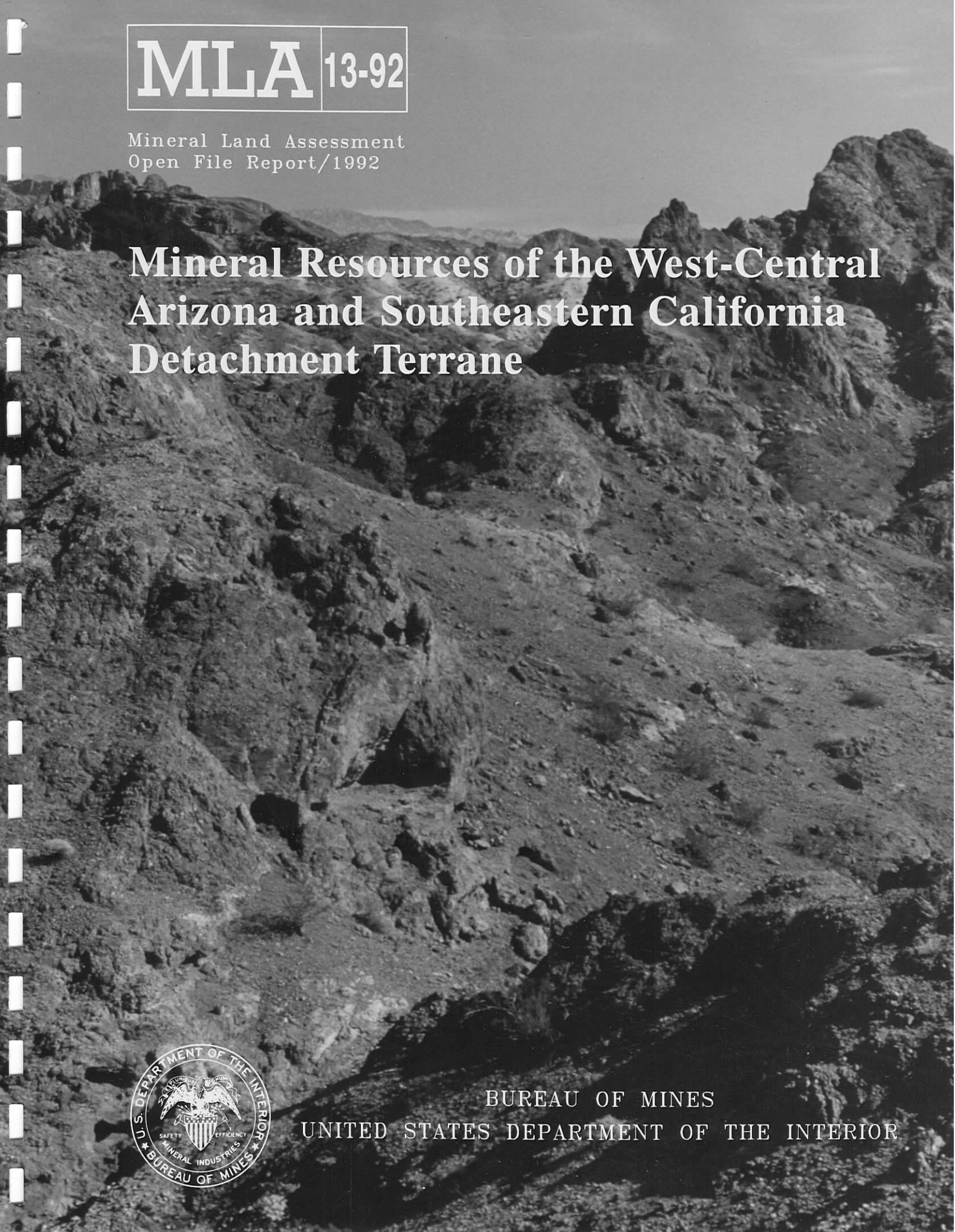
Mineral Land Assessment
Open File Report/1992

Mineral Resources of the West-Central Arizona and Southeastern California Detachment Terrane



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE WEST-CENTRAL ARIZONA AND SOUTHEASTERN CALIFORNIA DETACHMENT TERRANE

by

Terry J. Kreidler

MLA 13-92
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Intermountain Field Operations Center
Denver, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
Manuel Lujan, Jr., Secretary

BUREAU OF MINES
T S Ary, Director

PREFACE

The Federal Land Policy and Management Act of 1976 (Public Law 94-579) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine the mineral values, if any, that may be present. The results must be made available to the public and be submitted to the President and the Congress. This report combines the results of 14 wilderness study area surveys in west-central Arizona and southeastern California.

This open-file report summarizes the results of 14 Bureau of Mines wilderness studies. The report is preliminary and has not been edited or reviewed for conformity with the U.S. Bureau of Mines editorial standards. This study was conducted by personnel from the Branch of Resource Evaluation, Intermountain Field Operations Center, P. O. box 25086, Denver Federal Center, Denver, CO 80225.

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MINERAL RESOURCES OF THE WEST-CENTRAL ARIZONA AND SOUTHEASTERN CALIFORNIA DETACHMENT TERRANE

by

Terry J. Kreidler, U.S. Bureau of Mines

SUMMARY

In recent years, west-central Arizona and adjacent California have become the focus of geologic and exploration attention because of its excellent exposure of detachment-fault terrane. Detachment faults, normal faults with nearly horizontal fault planes, are the result of regional extension. Rocks on the lower plate consist of mylonitized intrusive, metasedimentary and crystalline rocks highly altered to chlorite; upper plate rocks comprise sedimentary, volcanic, metasedimentary, and metavolcanic rocks. The movement of the detachment fault causes the rocks on the upper plate to be severely fractured and brecciated thus making them ideal conduits for mineralizing fluids. Mineralization favored the more reactive sedimentary and volcanic rocks of the upper plate. Three gold deposits, located in upper plate rocks, are currently being mined along the Colorado River corridor: the Picacho Mine near Yuma, Arizona, 70 mi south of the study area; the American Girl Mine in southeastern California, 60 mi southwest; and the Copperstone Mine near the southern end of this study area.

Samples from the above three mines were used to create a geochemical model of detachment-related gold deposits. Antimony, arsenic, barium, copper, mercury, molybdenum, manganese, tungsten, and zinc all occur in the mine samples in concentrations at least three times greater than found elsewhere in similar rock types. Samples taken by the Bureau from the wilderness study areas contain similar anomalous concentrations of the same elements as well as elevated concentrations of several other elements including: lead, fluorine, cerium, uranium, and samarium.

The U.S. Bureau of Mines assessed the mineral resources of 14 wilderness study areas in this region of detachment fault exposure and identified 44 sites containing quantifiable resources in 7 of the wilderness study areas. All but 12 of the 44 sites are in upper-plate rocks. The Bureau samples primarily mineralized material; of 2,183 samples, 1,736 (nearly 80 percent) were taken from upper plate rocks, which is consistent with the detachment-terrane mineralization model.

The Copper Basin Mine near the Whipple Mountains was the only deposit considered in this evaluation to be of economic size and grade, but several areas have attributes that make them good exploration targets. Any upper plate volcanic or sedimentary rocks in this region would make good hosts for detachment-related mineralization and thus are good exploration targets. Specific exploration sites include: the area just north of the Planet Peak WSA, the Mohave Wash WSA and surrounding area, and the Arrastra Mountain area (for deep-seated precious-metal deposits). Rock types that host the mineral deposits in the northern Plomosa Mountains are most likely buried beneath the sand dunes of the Cactus Plain WSA, making this another attractive exploration target.

INTRODUCTION

In accordance with the Federal Land Policy and Management Act of 1976 (Public Law 94-579), and at the request of the Bureau of Land Management (BLM), the U.S. Bureau of Mines conducted mineral surveys, between 1979 and 1989, on 14 wilderness study areas (WSA's) in west-central Arizona and adjacent parts of southeastern California to appraise their mineral resources (fig. 1). Throughout this report, the terms "study area" and "west-central Arizona" are used to designate the 14 wilderness study areas and adjacent land, including adjacent parts of southeastern California.

Much attention has been focused on this region in recent years due to the discovery of several large-tonnage, low-grade gold deposits related to extensional tectonics (detachment faults). This report combines the Bureau data from the 14 WSA's and adds new data to present a regional study emphasizing the relationship of mineralization to detachment faulting.

Previous studies

The BLM WSA's and the respective report numbers are listed in Table 1.

Table 1.--Wilderness study areas covered in this report.

Study area	Total acres	Acres studied	Year studied	Report number	Reference
Arrastra Mtn./ Peoples Canyon Additions	78,775 20,428	78,775 20,428	1984 1987	MLA 22-85 MLA 25-88	Lane, 1985 Lane, 1988a
Aubrey Peak	16,550	16,550	1987-88	MLA 39-88	Lane, 1988b

Table 1.--Wilderness study areas covered in this report, continued.

Study area	Total acres	Acres studied	Year studied	Report number	Reference
Cactus Plain	70,360	53,270	1986	MLA 64-86	Kreidler, 1986
Chemehuevi Mtns.	82,348	82,348	1982	MLA 42-83	Kreidler, 1988
Crossman Peak	38,000	38,000	1979-82	MLA 82-83	Light and McDonnell, 1983
East Cactus Plain.	13,735	13,735	1987	MLA 81-87	Kreidler, 1987
Gibraltar Mtn.	25,260	18,807	1988	MLA 18-89	Scott, 1989
Mohave Wash	104,605	104,605	1987	MLA 2-89	McDonnell, 1989
Harcuvar Mtns.	74,778	25,287	1987	MLA 29-88	Tuftin, 1988
Planet Peak	17,645	16,430	1988	MLA 9-89	Kreidler, 1989
Rawhide Mtns.	55,320	40,025	1987	MLA 13-89	Tuftin, 1989
Swansea	41,690	15,755	1988	MLA 12-89	Ryan, 1989
Turtle Mtns.	105,200	105,200	1981-83	MLA 6-84	McDonnell, 1984
Whipple Mtns.	82,928	82,928	1980-83	MLA 50-87	Ridenour, 1987

Arrastra Mountain, Arrastra Mountain Additions, and Peoples Canyon are considered in this report as one WSA and will be referred to as Arrastra Mountain WSA. These three areas were combined, with minor boundary changes, into one area designated wilderness by the Arizona Desert Wilderness Act of 1990. The Act also designated Aubrey Peak, East Cactus Plain, Gibraltar Mountain, Harcuvar Mountains, Rawhide Mountains, and Swansea as wilderness; Crossman Peak, Mohave Wash, and Planet Peak have been returned to multiple use. Cactus Plain, Chemehuevi Mountains, Turtle Mountains, and Whipple Mountains remain WSA's. The fate of the three California areas (Chemehuevi, Turtle, and Whipple Mountains) will be determined by the wilderness bills currently before the Congress; the Arizona area (Cactus Plain) remains under study.

No attempt will be made to reiterate the details of each individual wilderness study; the reader is referred to the above reports for detailed information on the geology and mineral resources of each area.

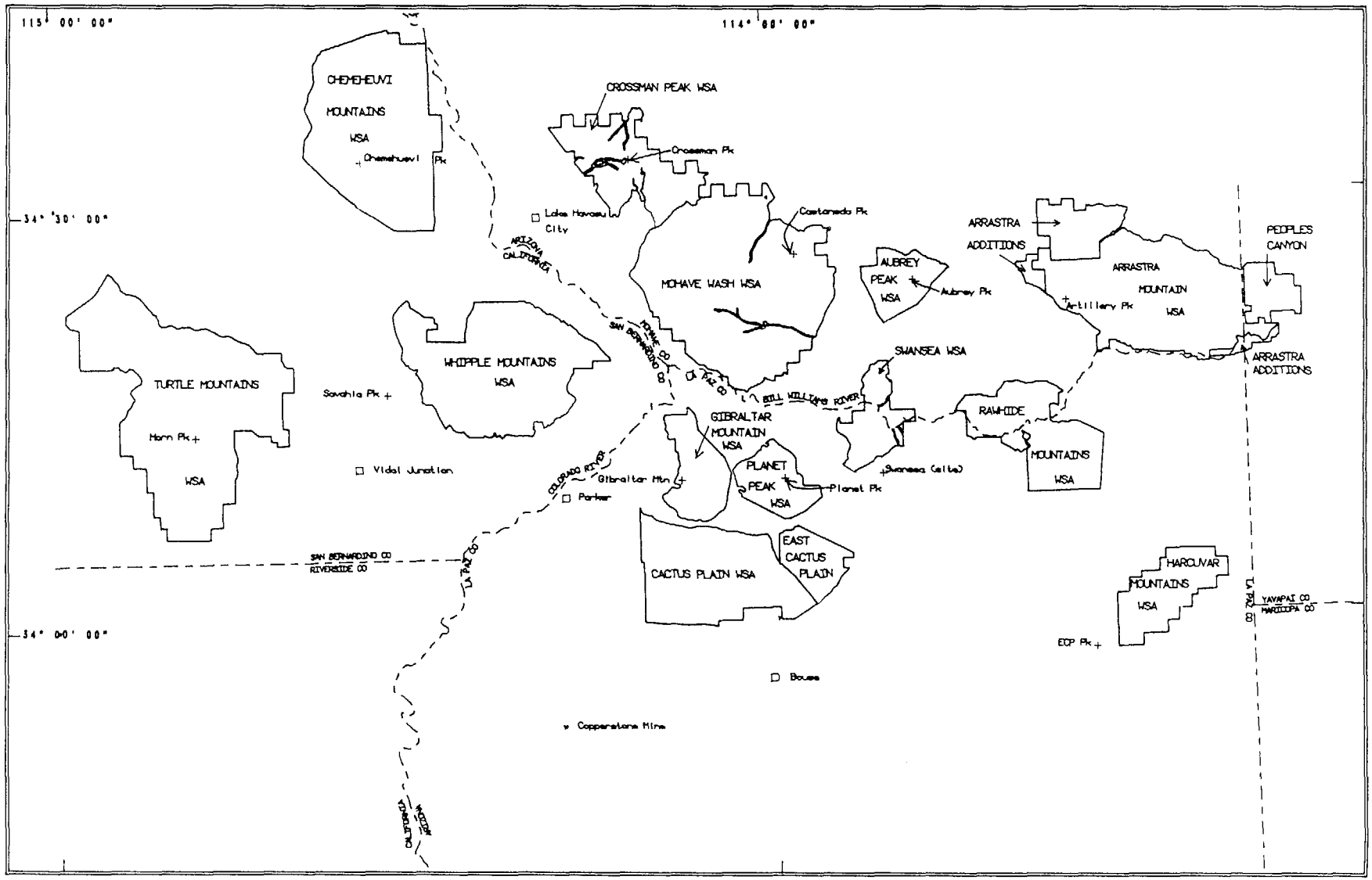


Figure 1.--Index map of the west-central Arizona and southeastern California detachment terrane

Methods of investigation

Data for the previously published and open-filed reports were compiled and pertinent data were digitized into a geographic information system (GIS); analytical data were entered into a database. Two Bureau geologists spent about six weeks in the field sampling areas between the WSA's to augment existing data (sample localities 1-82 on plate 1 and samples prefixed with WCA in the database).

Data from the earlier projects were combined and selected samples were rerun because some of the elements considered geochemically important had not been determined previously. Fifteen samples from Arrastra Mountain, 6 from Cactus Plain, 8 from Chemehuevi Mountains, 41 from Crossman Peak, 20 from Turtle Mountains, and 102 from Whipple Mountains WSA's were reanalyzed for 34 elements by instrumental neutron activation. All sample localities are shown on plate 1 with the exception of Whipple Mountains for which only the localities of reanalyzed samples are shown.

The data were entered into dBASE IV and are included in this report as a dBASE file on a 5.25 in. high density diskette. The database consists of 2,183 samples in 56 fields. The first five fields contain identification data; the remaining 51 fields are the analytical data. Appendix A is a code key for the abbreviations used in the database.

A geographic information system (ARC\INFO coupled to dBASE IV) was utilized to analyze data on a regional basis. Topographic maps and sample locations were digitized and tied into the database and maps showing the distribution of various elements and their relationship to the detachment faults were compiled (plates 2 through 15).

REGIONAL GEOLOGY

The following discussion of the regional geology is taken from an unpublished Bureau of Mines proprietary report on the Colorado River Tribes Reservation by Jean Dupree, U.S.Bureau of Mines, Denver,

Major deformation episodes in the Colorado River region during the Precambrian, early to middle Jurassic, Cretaceous, and Tertiary Periods have assembled a geologic puzzle that is only now beginning to be understood. One of the most important regional structural events, detachment faulting, was recognized only during the last 15 years. The Colorado River region contains some of the most spectacular

detachment-fault exposures in the world. Their discovery sparked an explosion of geologic research in the region, and the Whipple-Buckskin-Rawhide detachment fault has become an archetype for detachment faults. Cyprus Copperstone Gold Corporation's Copperstone Mine, on the southern end of the study area and the largest producing gold mine in Arizona since 1988, is reported to be detachment-related (Kelsey and others, 1988). Because large gold deposits are related to detachment fault systems, it is important to recognize and understand their salient features.

A detachment fault is a gently dipping normal fault produced during regional extension of the Earth's crust. It separates a complexly broken, upper fault plate from a less-fractured, ductilely stretched, lower fault plate (fig. 2). During extension (fig. 3), lower-plate rocks were pulled out from underneath a severely extended upper plate. As unloading brought them closer to the surface, the lower-plate rocks stopped deforming by ductile flow and were overprinted by brittle faulting. After extension ended, lower-plate rocks that often originated from the middle of the Earth's crust were locally juxtaposed to shallow, upper-plate rocks, the two unlike plates separated only by a detachment fault (Anderson and others, 1988). Mountain ranges that display middle-crust exposures are called "metamorphic core complexes" (Reynolds and others, 1988).

Detachment faulting in the region occurred between 16 and 19 million years ago during the Miocene Epoch (Wright and others, 1986). Detachment faults are found from British Columbia, Canada, to Sonora, Mexico, and seismic evidence reveals they are multiple, stacked faults (Frost and Okaya, 1987). In the west-central Arizona area, upper plates of detachment faults moved northeast (Davis and others, 1980) about 30 mi, relative to lower plates, thereby doubling the size of the original area (Gans and others, 1988). There are at least four models (and many more variations) that explain how detachment faults form (Howard and John, 1987). Current opinion favors a shear-zone model (fig. 3) proposed by Wernicke (1981), and his model will be the one primarily followed in this report.

Fault plate and fault surface characteristics

Upper-plate rocks are broken by high-angle normal faults called listric faults that curve into or end at a detachment fault (fig. 2). Spacing between listric faults in the Colorado River region is 0.5 to 2 mi

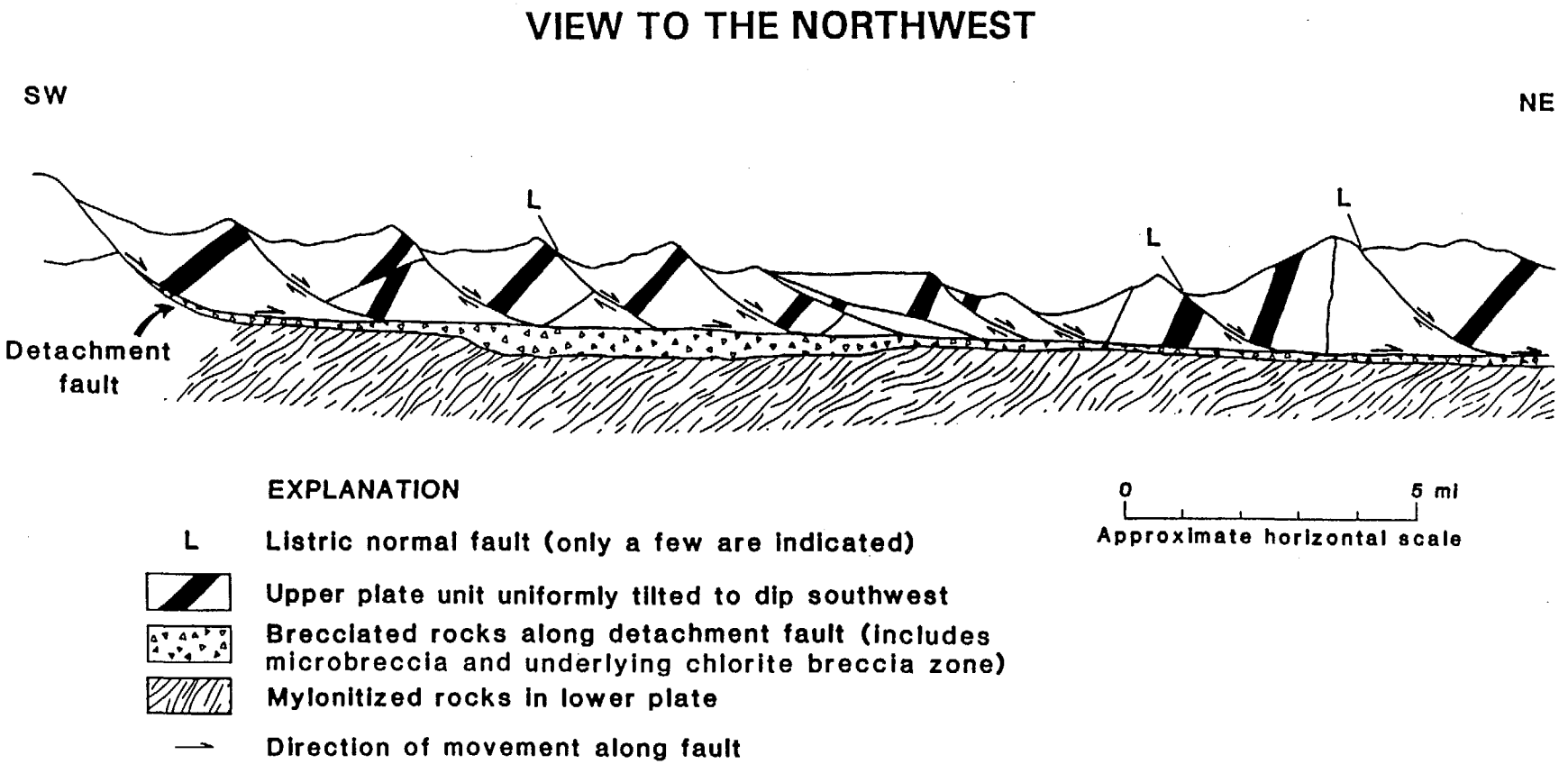
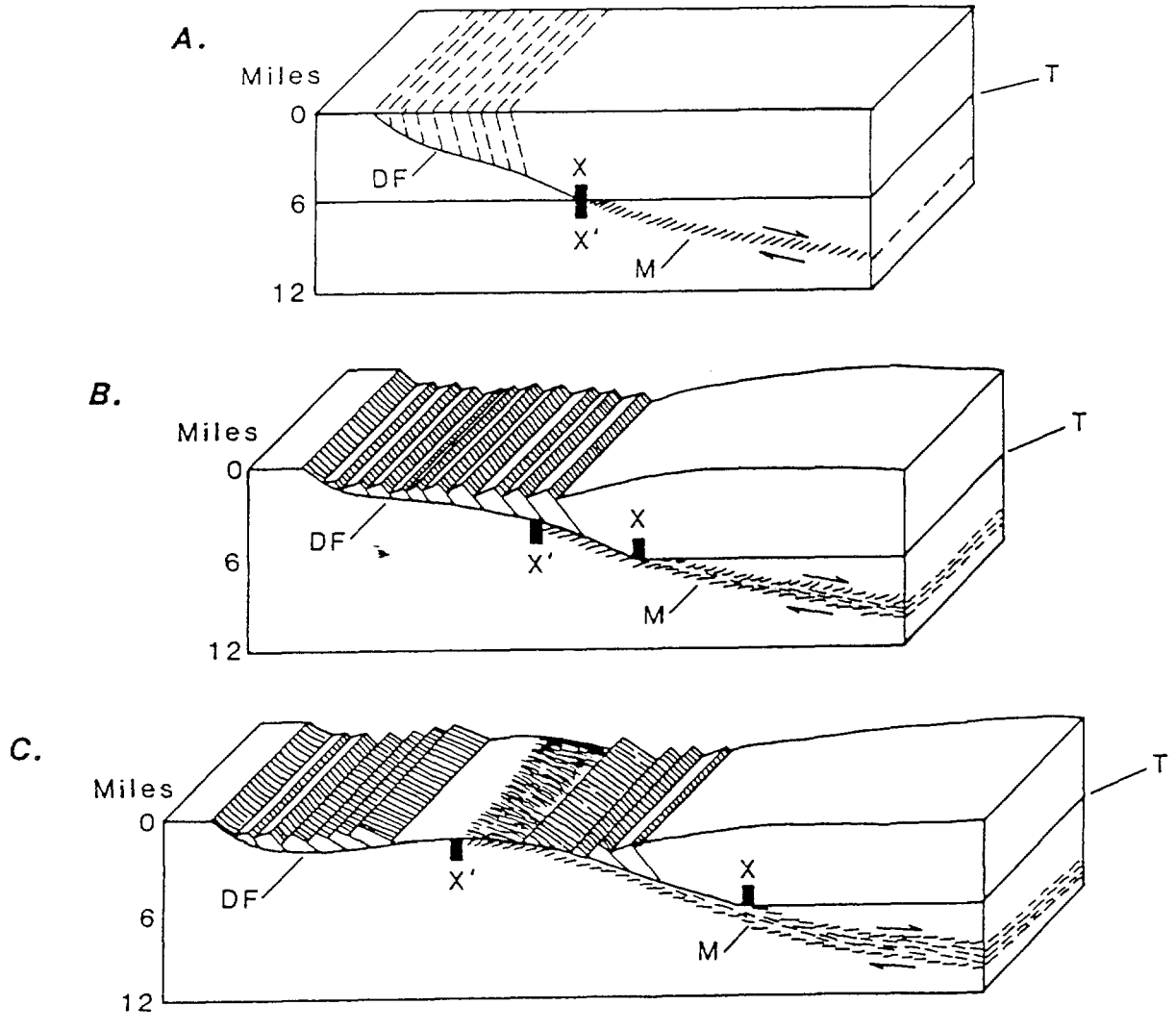


Figure 2.--Schematic cross section of a detachment fault in the west-central Arizona region.



EXPLANATION

DF – Detachment fault

M – Mylonite

T – Transition between ductile and brittle deformation

Figure 3.--Shear-zone model for detachment fault evolution (after Reynolds and others, 1988 and Wernicke, 1981)

(Howard and John, 1987). Listric faults generally strike northwest, dip northeasterly, and rotate upper-plate strata to dip southwest. The southwest dip is constant over multiple mountain ranges.

Simpler theories (as depicted on fig. 3) compare listric fault blocks to fallen dominoes. Such theories rely on listric and detachment faults to accommodate most of the extension, although smaller, antithetic faults are believed to have shifted rocks into spaces between listric-fault blocks (Adams and others, 1983). Structural reconstruction of the predetachment crust based on these faults, however, fails to piece the fault blocks back together. A recent theory (Davis and Lister, 1988) that overcomes this problem states that detachment faults splay as they evolve, and parts of the faults eventually become inactive. According to this theory, detachment faults alternately buckle and flatten as they form. Flattening occurs as new splays cross and capture parts of one plate and transfer them to the opposite plate.

Rocks immediately above and below the detachment fault are intensely brecciated and fragmented. A microbreccia occurs just below the fault (fig. 2) as a thin, flinty horizon. Such horizons often look like a hardened paste enclosing small rock chips (Coney, 1980), and both macroscopic and microscopic textures suggest that some microbreccias flowed as they formed (Davis and others, 1980). Microbreccias tend to make prominent ledges such as the one separating dark-colored upper-plate units from light-colored lower-plate units in the Whipple Mountains.

Several researchers (Adams and others, 1983; Davis and others, 1980; Hamilton, 1982) envision lower-plate rocks as having been pulled apart in huge fault-bounded lenses or "overlapping scales" (Hamilton, 1982), stacks of which are separated by low-angle shear zones.

Lower-plate rocks are often overprinted by mylonitic fabrics (fig. 2) acquired between 16 and 19 million years ago (Anderson, 1988). Mylonites, ranging in thickness from a few tens of feet to about 2.5 mi, contain compressed quartz grains, flattened feldspars, and aligned micas. Mylonite zones fade at depth and are not present in all detachment fault exposures (Davis and Lister, 1988). Mylonitization indicates that movement along a particular detachment fault was enough to bring middle crustal rocks (from at least 10 mi deep) to the surface (Wright and others, 1986). Formed under high temperatures and pressures by ductile flow, mylonites are the uplifted continuations of detachment faults in the middle crust (fig. 3).

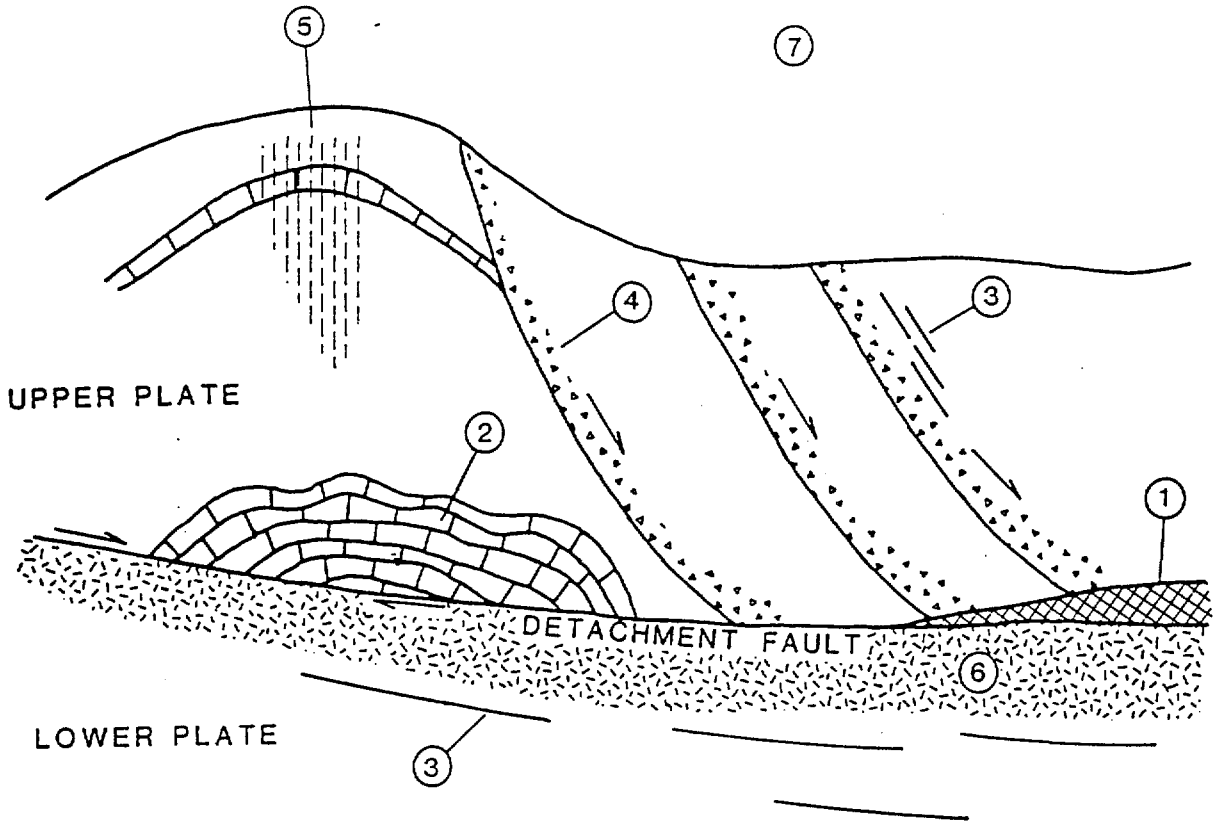
Compared to the upper plate, however, the lower plate is much less fractured and contains fewer rock types. Lower plate rocks have undergone chloritic alteration (fig. 2) to as much as 1,000 ft below the detachment fault.

The fault plane is often domed over mountain ranges; upper-plate rocks lap the flanks of most of the larger west-central Arizona region mountain ranges, such as the Whipple Mountains. On a regional scale, detachment-fault surfaces are gently wavy; the origin of the undulations is unknown. Some workers claim the undulations are not folds but gigantic flutings that developed parallel to the northeast-southwest movement (Davis and Lister, 1988; Woodard and Osborne,1980). Others believe detachment faults were later folded (Spencer, 1982). In the Whipple-Buckskin-Harcuvar Mountains area, ridges and furrows trend northeastward (parallel to the direction of extension), have wavelengths of 5 to 6 mi, and have amplitudes of 300 ft or greater (Frost, 1981). The undulations are important because they acted as conduits for the mineralizing fluids (Wilkins and Heidrick, 1982).

Mineralization related to detachment faults

Figure 4 shows the most common sites for ore deposition in detachment terranes; large gold deposits are most commonly found in upper plate rocks along detachment faults and listric faults. Faults in lower-plate settings do contain mineral deposits, but they are much smaller than upper-plate deposits. The host rock for many gold deposits is a gneiss or quartz-porphyry. The protolith (the rock type before metamorphism) for the gneiss was generally Jurassic silica-rich volcanics or quartz porphyry (Tosdal and others, 1985). Metamorphosed alteration areas (represented by kyanite, muscovite, and quartz) are often nearby (Spencer and others, 1988).

Numerous mines and prospects are found along the detachment faults in west-central Arizona and southeastern California. The most common mineral in these deposits is specular hematite, occurring as massive bodies or as disseminations in the host rock; chrysocolla and malachite typically fill fractures in the hematite. Chalcopyrite and pyrite are less common. Gangue minerals include barite, calcite, fluorite, manganese oxides, and quartz.



EXPLANATION

(1) Along detachment fault

(2) Replacement deposits in limestone or other reactive units

(3) Gash veins

(4) Listric fault breccia

(5) Fold axis veins

(6) Chlorite breccia

(7) Tear faults (in plane of paper)

Fault or fracturing

Direction of movement

Breccia

Limestone

Figure 4.--Simplified cross section showing typical mineralization sites in detachment fault settings (after Wilkins and others, 1986)

Wilkins and Heidrick (1982) identified five primary modes of mineralization associated with the Whipple-Buckskin-Rawhide detachment fault: 1) comminuted disseminations in the chlorite microbreccia, 2) massive sulfide-oxide replacements of reactive carbonate rocks, 3) open-space filling in crush breccia at the intersection of listric faults and the detachment fault, 4) antithetic and synthetic gash and fault veins, and 5) longitudinal fissure fillings along the crest or trough of megascopic folds. Much of the mineralization occurred during faulting as indicated by the abraded and crushed textures of many ore minerals (Spencer and Welty, 1989).

An extensive chloritic alteration zone underlies the detachment surface at nearly all places. The breccia is green and variably silicified. Epidote, hematite ,and limonite are commonly associated with this zone. The chloritic alteration locally affects the upper-plate rocks to as much as several hundred feet above the fault plane, but usually, upper-plate rocks rest directly on the fault surface with little or no alteration. This lack of chloritic alteration in most upper-plate rocks indicates that alteration occurred primarily prior to the final positioning of the plates. Hydrothermal fluids circulating through these breccia zones caused alteration of the breccias and most likely mobilized base and precious metals within the rocks and redeposited them as replacements or in fractures and fault zones along or above the detachment faults. (See Spencer and Welty, 1989.)

Examples of detachment-fault-related mineral deposits include the Artillery District manganese deposits (about 35 mi east of the Whipple Mountains) in the Artillery Mountains, copper and precious metal deposits in the Whipple Mountains (Wilkins and others, 1986), and gold at the Copperstone, Picacho, American Girl Mines, and possibly the deposit at the Mesquite Mine in southeastern California , though its origin as a detachment-related deposit is currently a topic of debate.

Copperstone Mine

The Copperstone Mine is the only currently active mine within the area of study. The following description of the geology and structure is taken from Kelsey and others (1988).

The Copperstone claim block is underlain by a Precambrian basement of gneiss, schist, quartzite, and intrusive rocks (fig. 5). Overlying this, and separated from it by a low-angle detachment fault, is a thin

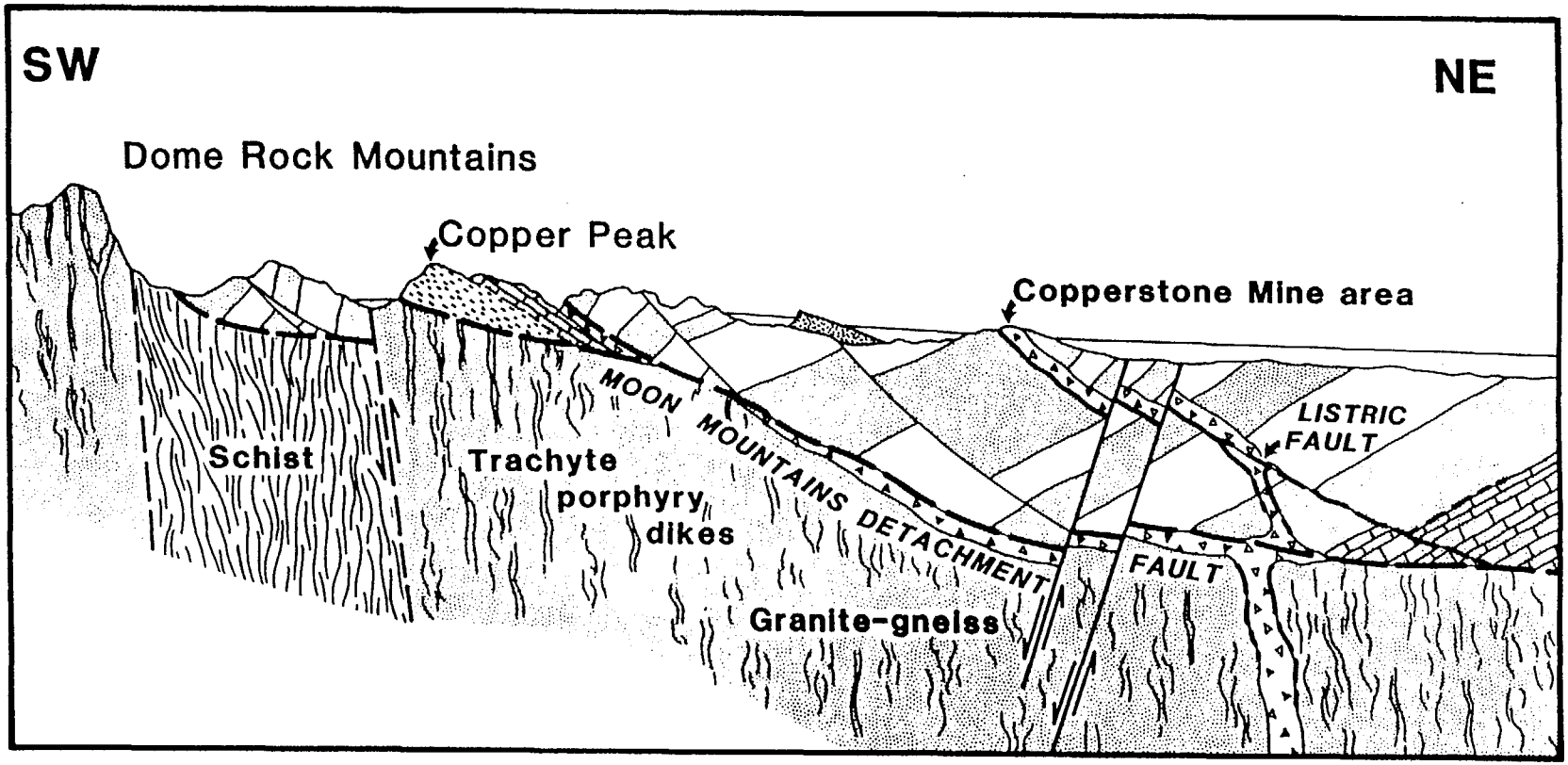


Figure 5.--Schematic geologic section of the Copperstone Mine area.
(from an unpublished Cyprus Copperstone report)

veneer of Paleozoic sedimentary rocks in turn overlain by a thick sequence of Mesozoic clastic strata and quartz latite extrusive rocks. The rocks on the upper plate of the detachment fault are cut by listric and other low-angle faults that are in turn crosscut by high-angle north-northwest and north-northeast striking faults. Copperstone ore is localized along one of these listric faults that probably joins, at depth, the detachment fault exposed about a mile southwest of the mine.

Gold is hosted by three rock units. The stratigraphically lowest unit is a weakly metamorphosed porphyritic quartz latite of middle Mesozoic age. It is a welded tuff containing quartz, potassium feldspar, and plagioclase phenocrysts in a matrix of quartz, feldspar, sericite, and chlorite. The second host is a chaotic breccia that overlies the quartz latite and is composed of angular to subrounded cobbles and blocks of quartz latite in a matrix of hematite, sericite, and clay. Proposed origins of the breccia include: 1) gravityslide event following deposition and metamorphism of the quartz latite tuff, 2) hydrothermal breccia, 3) collapse breccia, and 4) fault breccia. The third host is a vesicular basalt cut by gold-bearing amethyst-quartz-specularite veins. The basalt is highly altered to hematitic-clay and contains only minor gold.

Mineralization, most likely contemporaneous with detachment faulting in Miocene time, localized along a moderately dipping listric fault that separates mineralized quartz latite in the footwall from gold-bearing chaotic breccia in the hanging wall. The listric fault is in turn cut by high-angle north-northwest and north-northeast striking faults, which appear to have been active during the mineralizing phase.

Gold occurs in a complex system of intersecting veins of quartz-amethyst, specularite, goethite, barite-fluorite, carbonate, chrysocolla, and locally associated earthy red hematite. Gold is primarily associated with specularite and appears to be hydrothermal in origin.

Over the course of its six year life, the mine is expected to produce nearly 450,000 oz of gold from about 6 million tons of ore. The average grade is 0.082 oz/st.

A geochemical model of detachment-related mineralization

In order to better understand the geochemical data available for this region, the author felt that a geochemical model of detachment-related deposits should be developed. To this end, Cyprus Copperstone Gold Corp., Chemgold Inc., American Girl Mining Inc., and Goldfields Mining Corp. (operators of the

Copperstone, Picacho, American Girl, and Mesquite Mines, respectively) were contacted and mine tours were arranged. All except the Mesquite Mine allowed sampling. Twenty-three samples of mineralized and unmineralized rock were collected from the three mines; the data, arranged in order of ascending gold content to protect company confidentiality, is presented in table 2.

The average concentration of gold, antimony, arsenic, barium, chromium, cobalt, copper, manganese, mercury, molybdenum, terbium, tungsten, vanadium, and zinc in the mines exceeds three times the average concentrations found in similar rocks of felsic composition worldwide. The increased concentrations range from 3.1x (vanadium) to 173.9x (copper); gold is 670x the average for similar rock types. Tantalum, on the other hand, is notably depleted compared to the average for felsic rocks (0.3x).

Statistical analysis of the data shows copper and uranium have strong positive correlation coefficients with gold; the rest of the elements have a weak positive or negative coefficient (appendix C). The correlation coefficient is a statistical measure of one element's association with another. A strong positive coefficient (numbers close to one) means that as the concentration of element A increases, element B also increases. A strong negative coefficient (numbers close to negative one) means that as the concentration of element A increases, element B decreases. A weak coefficient (numbers, positive or negative, close to zero) means the elements have a more or less random association.

A generalized model of a hypothetical detachment-related gold deposit in west-central Arizona, then, will be found in rocks of the upper plate, usually within 1,000 feet above the fault plane, the detachment fault having prepared the ground by opening conduits for the mineralizing fluids. The mineralizing system will most likely be enriched in antimony, arsenic, barium, copper, mercury, molybdenum, manganese, tungsten, and zinc, and possibly chromium, cobalt, vanadium, and terbium. The barium anomaly is usually the most widespread, being detected up to several miles from the deposit.

KNOWN RESOURCES

The Bureau previously defined resources in 7 of the 14 WSA's studied in the detachment terrane; whether indicated or inferred, all but one of the resources are currently subeconomic. Table 3 lists the

Table 3.--Analytical data for three detachment-related gold mines in west-central Arizona and southeastern California.
(Symbols used: na, not analyzed; ‡, less than half the samples were above detection limit.)

AU-PPB	AG-PPM	SB-PPM	AS-PPM	BA-PPM	BI-PPM	BE-PPM	CD-PPM	CE-PPM	CS-PPM	CR-PPM	CO-PPM	CU-PPM	EU-PPM	F-PPM	HF-PPM	FE-PCT	LA-PPM	PB-PPM
8.0	<2.0	10.7	8.7	480.0	<1.0	<0.5	<5.0	71.0	2.3	140.0	25.0	6.0	<1.0	774.0	5.0	2.1	38.0	11.0
9.0	4.0	2.2	6.6	1900.0	2.0	<0.5	<5.0	77.0	4.4	130.0	12.0	16.0	<1.0	451.0	6.0	3.2	44.0	9.0
14.0	2.0	1.4	3.8	1800.0	<1.0	<0.5	<5.0	67.0	4.0	140.0	11.0	560.0	<1.0	519.0	4.0	5.8	32.0	9.0
14.0	<2.0	15.5	146.0	2000.0	<1.0	1.6	<5.0	120.0	11.0	92.0	15.0	30.0	1.0	662.0	6.0	3.6	51.0	5.0
22.0	<2.0	10.0	22.0	1400.0	<1.0	<0.5	<5.0	93.0	4.7	170.0	10.0	20.0	1.0	506.0	6.0	3.2	41.0	5.0
24.0	<2.0	14.0	10.0	2200.0	<1.0	<0.5	<5.0	130.0	8.2	69.0	16.0	26.0	1.0	615.0	7.0	4.2	54.0	4.0
25.0	<5.0	1.2	9.0	>30000.0	na	23.0	<10.0	40.0	4.0	<50.0	10.0	290.0	<2.0	na	<2.0	20.0	33.0	8.0
25.0	<2.0	0.3	7.5	720.0	2.0	1.6	<5.0	120.0	<0.5	120.0	<5.0	129.0	<1.0	751.0	6.0	>10.0	47.0	2.0
78.0	<2.0	13.6	6.9	1400.0	<1.0	0.6	<5.0	90.0	4.2	160.0	7.0	187.0	<1.0	655.0	6.0	3.6	38.0	6.0
304.0	<2.0	12.5	160.0	1300.0	<1.0	1.5	<5.0	94.0	11.0	81.0	14.0	22.0	1.0	619.0	5.0	3.5	41.0	11.0
346.0	<2.0	5.0	14.0	1200.0	<1.0	0.9	<5.0	48.0	1.7	49.0	9.0	1800.0	<1.0	391.0	3.0	>10.0	41.0	29.0
362.0	<2.0	2.3	15.0	1100.0	<1.0	<0.5	<5.0	37.0	4.3	250.0	7.0	1422.0	<1.0	425.0	3.0	4.1	16.0	78.0
391.0	<2.0	1.2	7.0	>20000.0	<1.0	<0.5	<5.0	58.0	3.7	130.0	9.0	2800.0	<1.0	524.0	5.0	10.0	36.0	11.0
610.0	<2.0	4.8	10.0	1100.0	<1.0	<0.5	<5.0	81.0	7.0	83.0	14.0	264.0	<1.0	1758.0	3.0	3.1	32.0	35.0
1070.0	<2.0	51.5	219.0	1400.0	<1.0	5.2	7.0	97.0	21.0	88.0	17.0	22.0	<1.0	668.0	4.0	3.6	43.0	14.0
1580.0	<2.0	5.6	17.0	>20000.0	20.0	<0.5	<10.0	23.0	3.0	190.0	9.0	973.0	<1.0	751.0	2.0	>10.0	20.0	28.0
1830.0	<2.0	1.8	15.0	1100.0	<1.0	<0.5	<5.0	64.0	4.0	78.0	<5.0	2300.0	<1.0	514.0	6.0	>10.0	35.0	4.0
2590.0	<2.0	46.3	220.0	1400.0	<1.0	4.5	<5.0	96.0	12.0	95.0	18.0	23.0	2.0	655.0	4.0	3.8	41.0	17.0
2760.0	<2.0	8.1	17.0	710.0	<1.0	<0.5	<5.0	71.0	9.5	110.0	18.0	65.0	1.0	1113.0	3.0	4.2	35.0	37.0
3220.0	<2.0	20.9	120.0	1500.0	<1.0	1.8	<5.0	78.0	14.0	56.0	14.0	21.0	<1.0	638.0	5.0	2.9	39.0	11.0
3420.0	<2.0	3.8	12.0	1500.0	<1.0	<0.5	<5.0	120.0	2.7	93.0	16.0	60.0	<1.0	1607.0	10.0	3.8	46.0	29.0
10300.0	10.0	1.4	5.5	460.0	<1.0	<0.5	<5.0	34.0	1.1	87.0	9.0	1950.0	<1.0	504.0	3.0	>10.0	22.0	3.0
32600.0	<2.0	5.1	7.8	13300.0	23.0	<1.5	<5.0	51.0	2.6	210.0	9.0	27000.0	<1.0	401.0	<1.0	10.0	18.0	20.0
Average concentrations																		
2678.3	‡	10.4	46.2	4694.3	‡	‡	‡	76.5	<6.2	<116.1	<11.3	1739.4	‡	703.7	<4.6	<7.1	36.3	16.8

LU-PPM	MN-PPM	MO-PPB	MO-PPM	NI-PPM	RB-PPM	SM-PPM	SC-PPM	NA-PCT	TA-PPM	TB-PPM	TH-PPM	W-PPM	U-PPM	V-PPM	YB-PPM	ZN-PPM	ZR-PPM
0.3	939.0	138.0	3.0	<20.0	130.0	5.3	10.0	4.2	0.8	0.6	10.0	7.0	3.3	47.0	<2.0	<100.0	<200.0
<0.2	535.0	5.0	<1.0	<20.0	150.0	6.5	9.2	2.6	1.5	<2.0	25.0	<1.0	5.3	43.0	<5.0	160.0	<200.0
<0.2	577.0	15.0	<1.0	<20.0	150.0	4.5	6.9	1.4	1.1	<2.0	19.0	<1.0	6.9	34.0	<5.0	<100.0	<200.0
0.5	399.0	2117.0	<1.0	<20.0	140.0	10.5	12.0	3.0	1.2	1.2	20.0	51.0	3.8	88.0	4.0	140.0	600.0
0.3	655.0	38.0	<1.0	<20.0	130.0	8.2	9.4	2.7	1.0	1.0	14.0	25.0	3.6	69.0	3.0	<100.0	<200.0
0.5	769.0	152.0	<1.0	<20.0	160.0	10.2	14.0	2.2	1.5	1.6	17.0	23.0	4.5	71.0	3.0	<100.0	480.0
<0.5	na	na	63.0	<50.0	43.0	3.4	2.5	0.2	<1.0	1.0	4.9	25.0	22.0	na	<5.0	<200.0	<500.0
<0.2	68.0	<5.0	16.0	<20.0	12.0	6.3	12.0	1.4	1.2	<2.0	32.7	4.0	7.9	134.0	<5.0	<100.0	<200.0
0.4	662.0	158.0	<1.0	<20.0	210.0	6.6	10.0	2.2	1.6	1.1	22.5	3.0	4.8	58.0	3.0	110.0	<200.0
0.2	698.0	218.0	<1.0	29.0	150.0	8.3	11.0	3.0	1.3	1.3	15.0	30.0	3.4	92.0	3.0	<100.0	<200.0
0.4	>10000.0	25.0	24.0	<20.0	49.0	5.7	5.1	0.3	<0.5	4.0	9.1	214.0	7.8	36.0	<5.0	<100.0	<200.0
<0.2	815.0	8139.0	17.0	<20.0	180.0	3.1	8.8	1.7	0.6	0.5	6.3	3.0	5.9	60.0	<2.0	850.0	<200.0
<0.2	2710.0	45.0	5.0	28.0	110.0	4.7	6.3	1.4	0.5	<2.0	16.0	41.0	15.0	32.0	<5.0	<100.0	<200.0
<0.2	1038.0	666.0	13.0	<20.0	260.0	5.6	10.0	1.4	1.0	0.7	12.0	26.0	6.8	86.0	<2.0	420.0	<200.0
0.4	736.0	271.0	<1.0	<20.0	180.0	8.0	11.0	2.4	1.1	0.6	17.0	16.0	3.3	87.0	4.0	190.0	470.0
<0.2	9260.0	295.0	17.0	20.0	90.0	3.0	2.8	0.2	<0.5	<2.0	5.5	30.0	13.0	27.0	<5.0	150.0	<200.0
<0.2	439.0	10.0	5.0	<20.0	190.0	4.4	7.1	0.5	<0.5	<2.0	16.0	138.0	13.0	34.0	<5.0	110.0	<200.0
0.4	854.0	861.0	<1.0	30.0	140.0	7.8	12.0	2.5	1.1	1.3	18.0	26.9	4.4	93.0	3.0	130.0	<200.0
<0.2	1694.0	199.0	2.0	24.0	230.0	5.6	12.0	1.5	1.3	0.8	12.0	82.0	12.0	95.0	<2.0	170.0	360.0
0.2	na	254.0	<1.0	21.0	150.0	8.3	8.4	2.2	1.0	1.2	16.0	34.0	3.3	76.0	<2.0	160.0	<200.0
0.4	1018.0	484.0	6.0	<20.0	270.0	8.6	12.0	3.1	1.9	1.4	21.4	59.0	10.0	84.0	<2.0	120.0	330.0
<0.2	497.0	25.0	7.0	20.0	42.0	3.1	5.0	0.8	0.8	<2.0	10.0	150.0	8.8	47.0	<5.0	<100.0	<200.0
0.7	893.0	193.0	8.0	25.0	33.0	2.8	2.7	0.1	0.6	2.0	8.0	25.0	52.0	12.0	5.0	<100.0	450.0
Average concentrations																	
‡	1355.6	644.5	8.4	‡	133.3	6.1	8.7	1.8	<1.0	1.6	15.9	44.2	9.4	82.9	‡	159.1	‡

44 areas of quantified resources within the 7 WSA's; the numbers in the following discussion refer to *map no.* in table 3.

The Crossman Peak WSA is the most heavily mineralized area and has the largest number of workings. More than 1100 samples were taken, and 15 areas containing resources were identified (Light and McDonnell, 1983). The resources in Crossman Peak, all in rocks of the upper plate of the Whipple Mountains-Chemehuevi detachment fault, occur as quartz veins filling faults and fissures in gneiss and granite, locally cut or intruded by volcanic rocks ranging from diabase to andesite in composition. Associated minerals include varying amounts of pyrite, chalcopyrite, galena, sphalerite, malachite, hematite, and limonite.

In the Whipple Mountains WSA, the known resources are partly in the upper plate (no. 16, 19, 20, 22, 23, 24, and 25) and partly in the lower plate (no. 17, 18, 21) of the Whipple Mountains detachment fault (Ridenour and others, 1988). The resources on the upper plate are relatively similar. Mineralized rock occurs as pods, veinlets, and veins of malachite, chrysocolla, hematite (usually specularite), with varying amounts of barite and pyrolusite. The minerals filled voids along fractures and faults (some of them listric) in volcanic rocks ranging in composition from basalt to dacite or in intrusive granites and quartz monzonites. Two notable exceptions are pyrolusite and psilomelane veins in fissures in fanglomerate (no. 16) and a typical porphyry copper deposit (no. 23). The copper porphyry is not known to be detachment related.

The three deposits in the lower plate consist of copper minerals, pyrite, and accessory barite and calcite in shear zones in mylonitic gneiss. The gneiss exhibits varying degrees of chloritization, silicification, and sericitization.

The resources in the Mohave Wash WSA occur in upper plate gneiss in quartz veins in faults bearing pyrite, galena, and minor malachite and chrysocolla (McDonnell, 1989).

In contrast, the resources in the Aubrey Peak WSA contain very little quartz. The metallic mineral deposits are associated with barite-calcite veins, veinlets, and pods in faults in volcanic breccia or granite. Fluorite, amethyst, and quartz are also present. The deposits are in the upper plate, but unlike the areas

Table 3.--Quantified resources in the west-central Arizona detachment terrane.
[All data from studies listed in table 1. Map no. refers to number on plate 1.
Symbols used: na, not applicable; st, short tons; oz/st, ounces per short ton;
*, indicated resource, all others inferred]

Map no.	Tonnage st	Au oz/st	Ag oz/st	Cu %	Other	Location
			Crossman Peak WSA			
1	350	0.21	0.32	na	na	Arrastra Well area
2	210	.05	na	na	na	Greenfeather Well area
3	775	.19	.62	na	na	Scotts Well area
4	120	.24	.45	na	na	Sec. 12, T. 14 N., R. 19 W.
5	610	.41	1.3	na	na	Sec. 14, T. 14 N., R. 19 W.
6	480	.21	.18	na	na	Sunrise Mine area
7	750	.08	na	na	na	Sec. 18, T. 14 N., R.18 W.
8	1,300	.05	na	na	na	Sec. 24, T. 14 N., R. 19 W.
9	5,600	.05	na	na	na	Little Maud Mine
10	820	.01	.57	na	na	Osiris/Ra Mines
11	920	.14	na	na	na	Sec. 24, T. 14 N., R. 19 W.
12	140	.02	.20	na	na	Lost Dutchman #1
13	470	1.74	.47	na	na	Lost Dutchman #2
14	8,000	.06	3.1	na	Pb, 0.8%, Zn, 0.6%	Pittsburgh Mine
15	1,120	na	.64	na	na	Southwest of Pittsburgh Mine
			Whipple Mountains WSA (California)			
16	2,600	na	na	na	Mn, 13.5%	Stewart Mine
17	2,075	na	na	4.0	na	New American Eagle Mine
18	* 1,350	na	na	.33	na	Lucky Green Mine
	600	na	na	.26	na	Do.
19	2,000	na	2.4	.6	na	Turk Silver Mine
20	4,100	na	7.0	.1	na	Twin Lode
21	* 142,000	na	na	.52	na	Blue Cloud Mine
	93,000	na	na	.43	na	Do.
22	3,000	.02	na	1.4	na	Nickel Plate Mine
23	7,000,000-11,000,000	na	na	1-2	na	Copper Basin Mine
24	16,500	.14	na	2.4	na	Crescent Mine
25	16,000	na	na	2.0	na	Quadrangle Copper Mine
			Mohave Wash WSA			
26	* 1,000	.06	na	na	na	Paloma mining district
27	* 550	.16	na	na	na	Do.

Table 3.--Quantified resources in the west-central Arizona detachment terrane, continued.

Map no.	Tonnage	Au oz/st	Ag oz/st	Cu %	Other	Location
			Aubrey Peak WSA			
28	400	0.08	na	na	na	Centennial Wash
29	15,000,000	na	na	na	perlite	Do.
30	4,000	na	10.03	na	na	Keenans Camp
31	7,000	na	4.44	na	na	Do.
32	3,000	na	6.02	na	na	Do.
			Arrastra Mountain WSA			
33	* 340	.37	na	na	na	Sec. 3, T. 12 N., R. 13 W.
34	140,000	na	na	na	U_3O_8, <0.1%	Near Artillery Peak.
35	520	na	na	na	Mn, 6.05%	Sec. 5, T. 11 N., R. 13 W.
			Rawhide Mountains WSA			
36	200,000	.02	.04	.2	na	Big Kimball Mine
37	20,000	.05	.01	.4	na	North-central fault
38	20,000	.02	.05	na	na	Alamo mining district
39	90,000	.05	.2	.7	na	Do.
40	400,000	.07	.2	.4	na	Do.
			Harcuvar Mountains WSA			
41	600	na	na	3.3	na	Webber adit
42	8,000	na	na	1.8	na	Webber adit area
43	300	.05	na	1.15	na	Western fault
44	2,000	.3	na	1.15	na	Do.

to the west, where the detachment fault lies at a relatively shallow depth, the depth to the detachment fault in this area is not known.

Resources in the Arrastra Mountain WSA are more varied than in the other areas (Lane, 1985, 1988a). Quantified resources include: gold in quartz fissure veins in gneiss with associated calcite, manganese, pyrite, limonite, and secondary copper minerals (no. 33); uranium in sandstone (no. 34); and vein manganese in sandstone (no. 35). As in Aubrey Peak, these deposits are in the upper plate, but the detachment fault is deeply buried. Fluid inclusion studies by Spencer and others (1989) on manganese deposits just to the southwest of the Arrastra Mountain WSA were not consistent with results of similar

studies of copper-iron deposits known to be associated with detachments so it is not currently known if the Arrastra deposits are detachment related.

The resources in the remaining two areas, the Rawhide Mountains and Harcuvar Mountains WSA's, are in the lower plate and are similar type occurrences: fissure veins of quartz or fluorite-calcite in gneiss with varying amounts of chrysocolla, barite, and limonite and silicic and sericitic alteration (Tuftin, 1988, 1989).

The resources were evaluated for this report using PREVAL, a computer program developed by Bureau of Mines personnel to run a prefeasibility study to estimate the economics of a deposit (Smith, 1992). Only the porphyry copper deposit at the Copper Basin Mine, near the Whipple Mountains WSA (table 2, no. 23) is estimated economic at October 1991 prices; all the other resources were uneconomic even at market prices of $1,000/oz gold, $20/oz silver, and $15/lb copper.

The PREVAL model proposed mining the Copper Basin deposit by open pit methods and processing the ore by a flotation mill handling 2,600 st/day resulting in a discounted cash flow rate of return of 15.04 percent and a net profit of about $98 million over a 13 year life span (appendix B).

Relationship of mineralization to the detachment fault

The distribution of data on plate 1 shows that mineralization favored the upper plate rocks. Most of the samples taken for these studies were from old mine workings, prospects, and visibly mineralized rocks, and about 80 percent were taken in upper plate rocks. Of 2,183 samples, 1,736 were from upper plate rocks, 429 from lower plate rocks, 12 from basalt flows which cover upper plate rocks, and 6 from the Cunningham Pass area in the Harcuvar Mountains, an area of unknown detachment-terrane relationship. Of the 44 quantified resources in table 3, 33 are on the upper plate and 11, mostly in the Rawhide Mountains and Harcuvar Mountains, are on the lower plate (plate 1).

Of the anomalous samples represented on plates 2-15, the vast majority are from upper plate rocks, ranging from 68 percent of the anomalous fluorine samples to 94 percent of the anomalous antimony samples. Only copper shows a reversal of this trend with 66 percent of the anomalous samples occurring on the lower plate.

Geochemistry

When compared with the geochemical model of detachment-related deposits, the samples taken in the study area contain most of the same anomalous concentrations of elements; only mercury shows a decrease from greater than 8x normal concentrations to greater than 2x. Several additional elements appear in anomalous concentrations that did not show up in the model: lead (ranging from 80.5x average concentrations in similar rock types in samples from upper plate rocks to 14x for lower plate rocks); fluorine (5.0x in upper plate rocks); and samarium (3.5x in upper plate rocks). It has not been determined if these additional anomalous elements indicate a different mineralizing event or merely reflect a different mineralizing fluid or host-rock chemistry. Table 4 compares selected elements from the model and upper and lower plate rocks to the average concentrations in similar rock types. Clearly, this region has been subjected to a mineralizing event (or events) similar to those which resulted in the Copperstone, Picacho, and American Girl gold deposits.

Statistical analysis of the data (appendix C) shows no strong correlation coefficient, positive or negative, of any element to gold. It would appear that the relationship of gold to the other elements is random in nature.

The maps in appendix D show that the distribution of the anomalous samples for the various elements is relatively uniform throughout the region; no patterns are evident in the data. This is partly due to the biased nature of the sampling done for the wilderness studies in which most samples were taken from mineralized rock and not on a random or systematic, non-biased grid. Almost all of the samples represent visibly mineralized rock.

INTERPRETATION

Several areas have geological and geochemical attributes similar to the model of detachment-related gold deposits. Any upper plate volcanic or sedimentary rocks in this region would make good hosts for detachment-related mineralization and thus are good exploration targets. Specific sites include (fig. 6) the area just north of the Planet Peak WSA, the Mohave Wash WSA and surrounding area, the Arrastra Mountain area, and the Cactus Plain WSA and surrounding area (fig. 6).

Table 4.--Comparison of element concentrations in the detachment-related gold deposit model and samples from upper and lower plate rocks from the west-central Arizona detachment terrane. [Au and Hg reported in parts per billion, Fe and Na in percent, all other elements in parts per million; na, not applicable.]

Element	Avg. conc. for samples from			Avg. conc.	Anomaly (x avg. conc.)		
	Model	Upper	Lower	Felsic rocks 1/	Model	Upper	Lower
Au	2678.3	1865.0	575.9	4.00	669.5	466.2	144.0
Sb	10.4	12.0	5.6	.20	51.5	59.8	27.8
As	46.2	60.0	19.0	1.50	30.8	40.0	12.6
Ba	4694.3	4021.2	3310.4	600.00	7.8	6.7	5.5
Ce	76.5	114.4	44.3	46.00	1.7	2.5	1.0
Cs	6.2	2.8	1.0	3.50	1.8	.8	.3
Cr	116.1	152.7	77.8	4.00	29.0	38.2	19.3
Co	11.3	21.9	38.6	1.00	11.3	21.9	38.6
Cu	1739.4	2642.6	6298.0	10.00	173.9	264.3	629.8
F	703.7	3948.8	1567.3	735.00	.9	5.0	2.1
Hf	4.6	8.6	4.0	4.00	1.2	2.2	1.0
Fe	7.1	6.4	13.4	na	na	na	na
La	36.3	54.6	20.6	25.00	1.4	2.2	.8
Pb	16.8	1610.0	283.9	20.00	.8	80.5	14.2
Mn	1925.5	3052.6	1189.5	500.00	3.8	6.1	2.4
Hg	649.5	179.1	132.9	80.00	8.1	2.2	1.7
Mo	8.4	77.7	11.3	2.00	4.2	38.8	5.6
Rb	139.3	87.7	60.3	150.00	.9	.6	.4
Sm	6.1	10.4	4.7	3.00	2.0	3.5	1.6
Sc	8.7	9.4	6.0	5.00	1.7	1.9	1.2
Ta	1.0	3.8	1.1	3.50	.3	1.1	.3
Tb	1.5	1.9	.9	.05	30.0	38.4	17.8
Th	15.4	24.3	6.2	17.00	.9	1.4	.4
W	44.2	79.4	26.3	2.00	22.1	39.7	13.1
U	9.4	10.3	9.0	4.80	1.9	2.2	1.9
V	62.9	66.1	76.8	20.00	3.1	3.3	3.8
Zn	169.1	1106.3	550.4	40.00	4.2	27.7	13.8

1/ From Levinson, 1980.

The area north of the Planet Peak WSA is underlain by Mesozoic metavolcanic and metasedimentary rocks and Tertiary sedimentary and volcanic rocks (Lehman and Spencer, 1989). Samples from the area contained elevated concentrations of antimony, arsenic, fluorine, barium, copper, manganese, tungsten, uranium, and zinc (fig. 6, appendix D). This area also contains two previously producing mines, the Planet and Mineral Hill Mines (Kreidler, 1989, p. 7). These attributes make this area a good target for future gold exploration.

The Mohave Wash WSA and adjacent area is underlain by Precambrian granitic rocks and gneiss and Tertiary sedimentary and volcanic rocks (Evans and others, 1990, p 4.). Samples from this area contain elevated concentrations of all the elements included on the element distribution maps in appendix D. Indeed, one of the reasons the Mohave Wash WSA was not made wilderness was the widespread

mineralization documented by the Bureau (McDonnell, 1989). This area is also a good target for future minerals exploration.

The Arrastra Mountain WSA and adjacent area is underlain by Precambrian igneous and metamorphic rocks and Tertiary sedimentary and volcanic rocks (Gray and others, 1989, pl. 1). Samples from the area contain elevated levels of all the elements included on the element distribution maps in appendix D except for molybdenum. These attributes make this area a good exploration target for precious-metal deposits; however, the targets here would be deeper than at any of the other potential areas due to the depth to the detachment fault.

The sequence of Precambrian granitic and Tertiary sedimentary and volcanic rocks that host the mineral deposits in the northern Plomosa Mountains most likely extend to the north where they are buried beneath the sand dunes of the Cactus Plain WSA. Samples from this area contain elevated concentrations of all elements except lead and silver that are shown on the element distribution maps in appendix D, making this another attractive exploration target.

CONCLUSIONS

The west-central Arizona region, and adjacent parts of southeastern California have been subjected to one or more periods of mineralization. Extensional tectonics, resulting in detachment faults and related listric faults sufficiently fractured the rocks on the upper plate forming conduits for the mineralizing fluids allowing deposition of disseminated and more massive replacement deposits. The lower plate rocks, primarily gneiss and mylonite, are less reactive and host few deposits of any size.

The Copper Basin Mine, near the Whipple Mountains, which is probably not detachment related, is the only deposit determined by available data and this evaluation to be of economic size and grade, but several other areas have geological and geochemical attributes that make them good exploration targets. Any upper plate volcanic or sedimentary rocks lying within about 1,000 ft of the detachment fault in this region would make good hosts for detachment-related mineralization and thus are good exploration targets. Specific sites include (fig. 6) the area north of the Planet Peak WSA, the Mohave Wash WSA, the Arrastra Mountain area, and the Cactus Plain area.

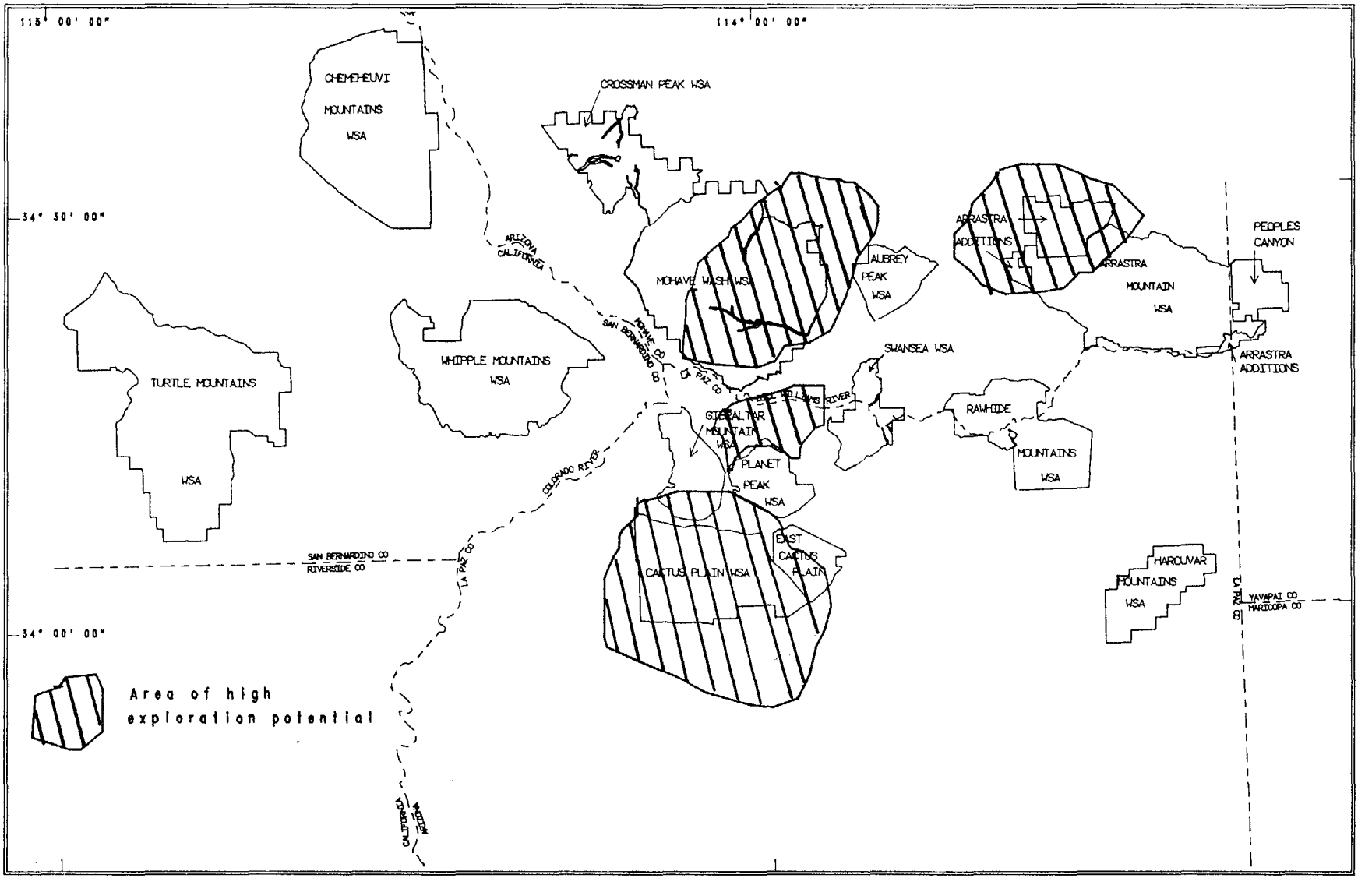


Figure 6.--Areas for possible future mineral exploration

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APPENDIX A.--Structure and key to abbreviations used in the west-central Arizona database.

Structure for database: WCADATA.DBF
Number of data records: 2183

Field	Field Name	Type	Width	Dec
1	LOC_ID	Numeric	6	
2	REPORT	Character	7	
3	PLATE	Character	1	
4	ANATYPE	Character	1	
5	RKTYPE	Character	2	
6	AU_OZT	Character	10	3
7	AU_PPB	Character	10	3
8	AG_OZT	Character	10	3
9	AG_PPM	Character	10	3
10	AL_PCT	Character	10	3
11	SB_PPM	Character	10	3
12	AS_PPM	Character	10	3
13	BA_PPM	Character	10	3
14	BE_PPM	Character	10	3
15	BI_PPM	Character	10	3
16	BR_PPM	Character	10	3
17	CD_PPM	Character	10	3
18	CA_PCT	Character	10	3
19	CE_PPM	Character	10	3
20	CS_PPM	Character	10	3
21	CR_PPM	Character	10	3
22	CO_PPM	Character	10	3
23	CU_PPM	Character	10	3
24	EU_PPM	Character	10	3
25	F_PPM	Character	10	3
26	GA_PPM	Character	10	3
27	HF_PPM	Character	10	3
28	FE_PCT	Character	10	3
29	LA_PPM	Character	10	3
30	PB_PPM	Character	10	3
31	LU_PPM	Character	10	3
32	MG_PCT	Character	10	3
33	MN_PPM	Character	10	3
34	HG_PPB	Character	10	3
35	MO_PPM	Character	10	3
36	NI_PPM	Character	10	3
37	P_PPM	Character	10	3
38	K_PCT	Character	10	3
39	RB_PPM	Character	10	3
40	SM_PPM	Character	10	3
41	SC_PPM	Character	10	3
42	SE_PPM	Character	10	3
43	NA_PCT	Character	10	3
44	SR_PPM	Character	10	3
45	TA_PPM	Character	10	3
46	TE_PPM	Character	10	3
47	TB_PPM	Character	10	3
48	TL_PPM	Character	10	3
49	TH_PPM	Character	10	3
50	TI_PCT	Character	10	3
51	W_PPM	Character	10	3
52	U_PPM	Character	10	3
53	V_PPM	Character	10	3
54	YB_PPM	Character	10	3
55	ZN_PPM	Character	10	3
56	ZR_PPM	Character	10	3
** Total **		528		

Field name

REPORT . . . . . AM = Arrastra Mountain/Peoples Canyon
. . . . . AMA = Arrastra Mountain Additions
. . . . . AP = Aubrey Peak
. . . . . CM = Chemehuevi Mountains
. . . . . CP = Cactus Plain
. . . . . ECP = East Cactus Plain
. . . . . GM = Gibraltar Mountain
. . . . . HM = Harcuvar Mountains
. . . . . MW = Mohave Wash
. . . . . PP = Planet Peak
. . . . . RM = Rawhide Mountains
. . . . . TM = Turtle Mountains
. . . . . WCA = Samples taken to fill in gaps between WSA's
. . . . . W, C, M, R = Whipple Mountains
. . . . . XP = Crossman Peak

PLATE . . . . . U = Upper
. . . . . L = Lower
. . . . . P = Post-detachment rocks (may overlie upper or lower plate)
. . . . . ? = Unknown

ANATYPE . . . . . A = Fire assay
. . . . . S = Semiquantitative optical emission spectrography
. . . . . P = Inductively coupled plasma--atomic emission spectroscopy
. . . . . N = Neutron activation
. . . . . C = any combination of A and S, P, or N

RKTYPE . . . . . S = Sedimentary
. . . . . I = Igneous (excluding volcanic rocks)
. . . . . V = Volcanic
. . . . . M = Metamorphic
. . . . . Q = Vein (quartz, calcite, barite, etc.)
. . . . . P = panned concentrate sample
. . . . . G = Geochemical stream sediment or soil sample

Elements are listed by their chemical symbols but are arranged in alphabetical order by name, except for gold and silver, which appear first. Thus mercury (symbol HG) will be found between manganese (MN) and molybdenum (MO). Abbreviations used with the elements are: OZT, ounce per short ton; PCT, percent; PPB, part per billion; PPM, and part per million.

DBASE will not accept less than (<) or greater than (>) symbols in a numeric field, but dBASE allows performing math functions only on numeric fields. In this study, less than symbols were changed to minus signs (-) and greater than symbols were dropped and the number given a decimal value of .111 (e. g. >90000 ppm became 90000.111ppm). The element fields were then changed from character to numeric and math functions were performed. If the fields are changed from character to numeric without replacing the less than and greater than symbols, the symbols disappear.

U.S. Bureau of Mines
Prefeasibility Evaluation Summary

Property Name: Copper Basin, CA

Evaluated By: T. Kreidler

Date: 03-Apr-92 02:12 PM

* Comments:

GEOLOGIC SUMMARY:

In-situ ore reserve:		11,000,000 Short Tons	
In-situ grade:			Equivalent Value
	Gold	0 tr oz/st	0.000 g/mt
	Silver	0 tr oz/st	0.000 g/mt
	Lead	0 % Pb	
	Zinc	0 % Zn	
	Copper	2 % Cu	
	Molybdenum	0 % MoS2	
	Platinum	0 tr oz/st	0.000 g/mt
	Palladium	0 tr oz/st	0.000 g/mt
	Nickel	0 % Ni	
Ore dilution:		3 %	
Ore recovery:		90 %	
Calculated recoverable ore reserve:		10,197,000 Short Tons	
Calculated diluted ore feed grades:			
	Gold	0.000 tr oz/st	0.000 g/mt
	Silver	0.000 tr oz/st	0.000 g/mt
	Lead	0.000 Pb	
	Zinc	0.000 Zn	
	Copper	1.942 Cu	
	Molybdenum	0.000 MoS2	
	Platinum	0.000 tr oz/st	0.000 g/mt
	Palladium	0.000 tr oz/st	0.000 g/mt
	Nickel	0.000 Ni	

METAL PRICES FOR THIS EVALUATION:

(Values in U.S. Dollars)	Gold	350.00 $/tr oz		
	Silver	4.00 $/tr oz		
	Lead	0.40 $/lb		
	Zinc	0.80 $/lb		
	Copper	1.25 $/lb	(Cathode Cu fob mill @	$1.10 /lb)
	Molybdenum	3.05 $/lb MoS2	(fob mill)	
	Platinum	485.00 $/tr oz		
	Palladium	135.00 $/tr oz		
	Nickel	5.75 $/lb		

MINING SUMMARY:

Mining Method:	Small Open Pit	
Mining Rate - ore	3565 st/day	
Mining Rate - waste	7130 st/day	

Operating Days per Year	260 days/yr
Preproduction Development	2 years
Mine Life	11 years
Ore Recovery	90 %

MINERAL PROCESSING SUMMARY:

Processing Method: One Product Flotation Plant
Processing Rate 2,649 st/day
Operating Days per Year 350 days/yr

	Process Recovery:	Concentrate Grade:	tr oz/st of concentrate Au	Ag
Gold	76.00%	NA	NA	NA
Silver		NA	NA	NA
Lead		73.00% Pb		
Zinc		58.00% Zn		
Copper	91.00%	28.00% Cu		
Molybdenum		91.00% MoS2	NA	NA
Platinum		NA	NA	NA
Palladium		NA	NA	NA
Nickel		12.00% Ni	NA	NA

Recoverable Metal per Year:
(Mill Product Only)

Gold	0.0 tr oz/yr
Silver	0.0 tr oz/yr
Lead	0.00 st/yr concentrate
Zinc	0.00 st/yr concentrate
Copper	58509.47 st/yr concentrate
Molybdenum	0.00 st/yr concentrate
Platinum	0.0 tr oz/yr
Palladium	0.0 tr oz/yr
Nickel	0.00 st/yr concentrate

****

TRANSPORTATION SUMMARY:

(Concentrates only) Commodity:	Truck Distance	Rail Distance	Ocean Transport	Total Cost
Lead	mi	mi		
Zinc	mi	mi		
Copper	50 mi	800 mi	N	$2,457,398
Molybdenum	mi	mi		
Nickel	mi	mi		
Total Annual Charge				$2,457,398

****

SMELTER AND REFINERY CHARGES:

Commodity:	Smelter Charge	Refinery Charge	Pay For
Gold	NA	$0	0.997
Silver	NA	$0	0.99
Lead		NA	(see smelter schedule)
Zinc		NA	(see smelter schedule)
Copper	$4,797,776	$3,178,234	(see smelter schedule, Cathode sold fob)
Molybdenum	NA	NA	(sold fob mill)
Platinum			0.94
Palladium			0.94
Nickel			(see smelter schedule)

Total Annual Charge	$4,797,776	$3,178,234

****

MINE COST SUMMARY:

Mining Method	Small Open Pit
Mining Rate - ore	3,565 st/day
Mining Rate - waste	7,130 st/day
Operating Days per Year	260 days/yr

Cost Component:	Annual Operating Cost	Capital Cost
Labor	$2,064,113	$1,834,398
Equipment	$731,426	$14,515,856
Steel	$76,771	$382,109
Fuel/Lube	$592,116	$270,025
Explosives	$424,013	$182,101
Tires	$137,895	$72,421
Construction Materials	$96,665	$642,774
Sales Tax	$88,014	$949,945
Total Cost	$4,211,014	$18,849,629

Operating Cost per st Ore	$4.54 $ /st ore
Working Capital	$1,457,659

****

BENEFICIATION COST SUMMARY:

Concentration Method	One Product Flotation Plant
Concentration Rate	2,649 st/day ore
Operating Days per Year	350 days/yr

Cost Component:	Annual Operating Cost	Capital Cost
Labor	$3,125,687	$2,468,919
Equipment	$1,526,560	$5,860,023
Steel	$687,945	$1,274,991
Fuel and Lube	$160,269	NA
Reagents	$714,833	NA
Construction Materials	NA	$7,254,124
Electricity	$1,143,437	NA
Sales Tax	$178,804	$888,744
Total Cost	$7,537,535	$17,746,801

Operating Cost per st Ore	$8.13 $ /st ore
Working Capital	$1,938,223

****

FINANCIAL ASSUMPTIONS SUMMARY:

Rate of Return (DCFROR)	15.00%		
Inflation Rate	0.00%	(op costs)	0.00% Commodity Inflation
Debt (amount financed)	60.00%		
Loan Interest Rate	10.00%		5 Years
Federal Tax Rate	Alternative Minimum Tax		

Minimum Tax Rate	20.00%
State Tax Rate	5.00%
Severance Tax Rate	2.00%
Depreciation Method	Units of Production
Depletion Rate	15% or 22%
Property Tax Rate	1.10%
Royalty Rate (NSR)	6.00%

Cost Adjustment/Update Factors

1.000	Mine Operating Cost
1.000	Mill Operating Cost
1.000	Mine Capital Cost
1.000	Mill Capital Cost

CASH FLOW SUMMARY:

	Cumulative Values
Revenue	432637130
Royalty	-19072179
Operating Costs	-244001529
Loan Payments (P+I)	-31649613
Depreciation/Amortization	0
Depletion	0
Tax Loss Carry Forward	0
Net Proceeds Tax	-2594528
Property Taxes	-4350286
Severance Taxes	-8652743
State Taxes	-2217179
Federal Taxes	-22384405
Net Cash Flow	97714668

Net Present Value (NPV)	67557	at an ROR of	15.00%	61780282 at an ROR of 0.00%
Internal Rate of Return (DCFROR)	15.04%			

PERCENT GROSS REVENUE FROM:

		ANNUAL VALUE @ the MILL
Gold	0.00%	0
Silver	0.00%	0
Lead	0.00%	0
Zinc	0.00%	0
Copper	100.00%	40,956,626
Molybdenum	0.00%	0
Platinum	0.00%	0
Palladium	0.00%	0
Nickel	0.00%	0
	TOTAL	40,956,626

ANNUAL CASH FLOW SUMMARY:

Year	1	2	3	4	5	6	7	8
Capital Investment	17,194,808	17,194,808						
Working Capital			3,395,882					
Gross Revenue			39,330,648	39,330,648	39,330,648	39,330,648	39,330,648	39,330,648
-Mine Operating Cost			4,211,014	4,211,014	4,211,014	4,211,014	4,211,014	4,211,014
-Mill Operating Cost			7,537,535	7,537,535	7,537,535	7,537,535	7,537,535	7,537,535
-Transportation			2,457,398	2,457,398	2,457,398	2,457,398	2,457,398	2,457,398
-Smelter/Refinery Charge			7,976,010	7,976,010	7,976,010	7,976,010	7,976,010	7,976,010
-Royalty			1,733,834	1,733,834	1,733,834	1,733,834	1,733,834	1,733,834
-Interest Expense			2,399,539	2,006,500	1,574,158	1,098,582	575,448	0
Gross Profit			13,015,318	13,408,356	13,840,698	14,316,275	14,839,409	15,414,857

-Preproduction (70%)	772,385	772,385						
-Depreciation			2,925,709	2,925,709	2,925,709	2,925,709	2,925,709	2,925,709
-Amortization (30%)			132,409	132,409	132,409	132,409	132,409	
-Net Proceeds Tax			201,792	209,653	218,300	227,811	238,274	249,783
-Severance Tax			786,613	786,613	786,613	786,613	786,613	786,613
-Property Tax		189,143	378,286	378,286	378,286	378,286	378,286	378,286
-Depletion			6,143,494	6,143,494	6,143,494	6,143,494	6,143,494	6,143,494
-Tax Loss Carry Forward			1,733,913	0	0	0	0	0
Net Taxable Income	(772,385)	(961,528)	713,102	2,832,193	3,255,888	3,721,953	4,234,624	4,930,972
-State Income Tax			35,655	141,610	162,794	186,098	211,731	246,549
-Federal Income Tax			1,371,319	1,795,137	1,879,876	1,973,089	2,075,624	2,214,893
-Loan Principal			3,930,384	4,323,422	4,755,765	5,231,341	5,754,475	0
+Depreciation			2,925,709	2,925,709	2,925,709	2,925,709	2,925,709	2,925,709
+Amortization			132,409	132,409	132,409	132,409	132,409	0
+Depletion			6,143,494	6,143,494	6,143,494	6,143,494	6,143,494	6,143,494
-Working Capital			3,395,882					
+Working Capital Recapture								
+Income Loss Carry Forward			1,733,913	0	0	0	0	0
Annual Cash Flow	(17,967,193)	(18,156,336)	2,915,387	5,773,635	5,659,065	5,533,037	5,394,406	11,538,733

Year	9	10	11	12	13
Capital Investment					
Working Capital					
Gross Revenue	39,330,648	39,330,648	39,330,648	39,330,648	39,330,648
-Mine Operating Cost	4,211,014	4,211,014	4,211,014	4,211,014	4,211,014
-Mill Operating Cost	7,537,535	7,537,535	7,537,535	7,537,535	7,537,535
-Transportation	2,457,398	2,457,398	2,457,398	2,457,398	2,457,398
-Smelter/Refinery Charge	7,976,010	7,976,010	7,976,010	7,976,010	7,976,010
-Royalty	1,733,834	1,733,834	1,733,834	1,733,834	1,733,834
-Interest Expense	0	0	0	0	
Gross Profit	15,414,857	15,414,857	15,414,857	15,414,857	15,414,857
-Preproduction (70%)					
-Depreciation	2,925,709	2,925,709	2,925,709	2,925,709	2,925,709
-Amortization (30%)					
-Net Proceeds Tax	249,783	249,783	249,783	249,783	249,783
-Severance Tax	786,613	786,613	786,613	786,613	786,613
-Property Tax	378,286	378,286	378,286	378,286	378,286
-Depletion	6,143,494	6,143,494	6,143,494	6,143,494	6,143,494
-Tax Loss Carry Forward	0				
Net Taxable Income	4,930,972	4,930,972	4,930,972	4,930,972	4,930,972
-State Income Tax	246,549	246,549	246,549	246,549	246,549
-Federal Income Tax	2,214,893	2,214,893	2,214,893	2,214,893	2,214,893
-Loan Principal	0	0	0	0	
+Depreciation	2,925,709	2,925,709	2,925,709	2,925,709	2,925,709
+Amortization	0	0	0	0	0
+Depletion	6,143,494	6,143,494	6,143,494	6,143,494	6,143,494
-Working Capital					
+Working Capital Recapture					3,395,882
+Income Loss Carry Forward					
Annual Cash Flow	11,538,733	11,538,733	11,538,733	11,538,733	14,934,615

ANALYTICAL DATA FOR SAMPLES FROM THE WEST-CENTRAL ARIZONA DETACHMENT TERRANE (FROM WCADATA.DBF)
APRIL 28, 1992

Variable	No. of Samples		Mean	Confidence Limit		Standard Deviation	Coef. of Variation
	Total	>DL*		Lower	Upper		
Au	2183	1024	3578.01	2784.68	4371.34	12936.92	3.62
Ag	2183	314	31.16	22.13	40.20	81.36	2.61
Sb	2183	681	7.66	5.24	10.08	32.15	4.20
As	2183	734	73.41	47.84	98.98	352.86	4.81
Ba	2183	1440	6069.69	4555.37	7584.01	29293.87	4.83
Bi	2183	147	40.39	10.29	70.50	184.70	4.57
Br	2183	95	5.57	4.14	7.01	7.06	1.27
Cd	2183	102	35.76	16.29	55.24	99.14	2.77
Ce	2183	596	117.62	91.83	143.41	320.58	2.73
Cs	2183	345	3.35	2.89	3.81	4.37	1.30
Cr	2183	833	142.00	128.64	155.37	196.46	1.38
Co	2183	550	35.80	30.68	40.92	61.14	1.71
Cu	2183	1057	3819.52	3329.59	4309.46	8117.50	2.13
Eu	2183	131	2.85	2.61	3.08	1.36	0.48
F	2183	298	3043.15	1923.98	4162.32	9816.91	3.23
Hf	2183	498	9.52	7.40	11.63	24.01	2.52
Fe	2183	1066	7.37	6.76	7.98	10.17	1.38
La	2183	675	53.82	40.06	67.58	182.09	3.38
Pb	2183	1060	2170.75	1674.57	2666.94	8232.72	3.79
Lu	2183	175	1.24	0.84	1.65	2.71	2.18
Mn	2183	728	4259.20	2863.45	5654.95	19181.97	4.50
Hg	2183	479	182.60	139.68	225.52	478.03	2.62
Mo	2183	550	55.69	0.63	110.76	657.39	11.80
Ni	2183	394	70.64	59.08	82.21	116.77	1.65
Rb	2183	624	95.16	89.14	101.17	76.49	0.80
Sm	2183	449	9.32	7.81	10.83	16.28	1.75
Sc	2183	745	8.89	8.29	9.50	8.36	0.94
Na	2183	848	1.10	1.02	1.18	1.25	1.14
Ta	2183	247	1.95	1.49	2.42	3.72	1.91
Tb	2183	282	2.24	1.91	2.58	2.85	1.27
Th	2183	618	23.69	11.10	36.27	159.34	6.73
W	2183	590	82.99	59.06	106.93	296.02	3.57
U	2183	708	14.63	7.29	21.98	99.59	6.81
V	2183	375	81.17	69.85	92.49	111.50	1.37
Yb	2183	200	7.64	6.54	8.74	7.92	1.04
Zn	2183	1267	1486.31	1224.77	1747.85	4745.20	3.19
Zr	2183	223	659.89	472.83	846.95	1417.43	2.15

* > DL = Greater than detection limit

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is AG, with a mean value of 2.62.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: AG(hat) = a + b * AU
AG(hat) = 2.272 + 0.000 * AU
Correlation coefficient, r(AG,AU) = 0.107

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	28345.78	1	28345.78	25.074	2.708
Residual	2465565.20	2181	1130.47		
Total	2493911.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is SB, with a mean value of -53.73.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.005
Regression equation: SB(hat) = a + b * AU
SB(hat) = -59.028 + 0.005 * AU
Correlation coefficient, r(SB,AU) = 0.289

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	6676220.00	1	6676220.00	198.225	2.708
Residual	73456144.00	2181	33680.03		
Total	80132368.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is AS, with a mean value of 13.01.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.003
Regression equation: AS(hat) = a + b * AU
AS(hat) = 10.549 + 0.003 * AU
Correlation coefficient, r(AS,AU) = 0.108

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	1432862.75	1	1432862.75	25.831	2.708
Residual	120983808.00	2181	55471.72		
Total	122416672.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is BA, with a mean value of 3980.82.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.310
Regression equation: BA(hat) = a + b * AU
BA(hat) = 4284.919 + -0.310 * AU
Correlation coefficient, r(BA,AU) = -.132

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	21963751000.00	1	21963751000.00	38.903	2.708
Residual	%1231348300000.00	2181	564579710.00		
Total	%1253312040000.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is BI, with a mean value of -6.49.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.001
Regression equation: BI(hat) = a + b * AU
BI(hat) = -7.930 + 0.001 * AU
Correlation coefficient, r(BI,AU) = 0.202

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	495870.84	1	495870.84	92.334	2.708
Residual	11712880.00	2181	5370.42		
Total	12208751.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is BR, with a mean value of -0.87.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: BR(hat) = a + b * AU
BR(hat) = -0.872 + -0.000 * AU
Correlation coefficient, r(BR,AU) = -.006

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	0.72	1	0.72	0.088	2.708
Residual	17875.95	2181	8.20		
Total	17876.67	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is CD, with a mean value of -37.54.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.001
Regression equation: CD(hat) = a + b * AU
CD(hat) = -36.602 + -0.001 * AU
Correlation coefficient, r(CD,AU) = -.084

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	208422.20	1	208422.20	15.438	2.708
Residual	29444440.00	2181	13500.43		
Total	29652862.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is CE, with a mean value of 31.00.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: CE(hat) = a + b * AU
CE(hat) = 31.100 + -0.000 * AU
Correlation coefficient, r(CE,AU) = -.006

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	2524.31	1	2524.31	0.082	2.708
Residual	67420792.00	2181	30912.79		
Total	67423320.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is CS, with a mean value of 0.25.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: CS(hat) = a + b * AU
CS(hat) = 0.249 + -0.000 * AU
Correlation coefficient, r(CS,AU) = -.004

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	0.41	1	0.41	0.038	2.708
Residual	23155.47	2181	10.62		
Total	23155.87	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is CR, with a mean value of 49.86.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.001
Regression equation: CR(hat) = a + b * AU
CR(hat) = 48.911 + 0.001 * AU
Correlation coefficient, r(CR,AU) = 0.069

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	212793.56	1	212793.56	10.565	2.708
Residual	43926468.00	2181	20140.52		
Total	44139260.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is CO, with a mean value of 5.49.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: CO(hat) = a + b * AU
CO(hat) = 5.442 + 0.000 * AU
Correlation coefficient, r(CO,AU) = 0.014

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	561.75	1	561.75	0.402	2.708
Residual	3049412.80	2181	1398.17		
Total	3049974.50	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is CU, with a mean value of 1849.15.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.002
Regression equation: CU(hat) = a + b * AU
CU(hat) = 1847.246 + 0.002 * AU
Correlation coefficient, r(CU,AU) = 0.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	856138.69	1	856138.69	0.024	2.708
Residual	77538853000.00	2181	35551972.00		
Total	77539713000.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is EU, with a mean value of -0.35.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: EU(hat) = a + b * AU
EU(hat) = -0.347 + -0.000 * AU
Correlation coefficient, r(EU,AU) = -.009

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	0.25	1	0.25	0.158	2.708
Residual	3393.52	2181	1.56		
Total	3393.77	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is F, with a mean value of 415.42.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.001
Regression equation: F(hat) = a + b * AU
F(hat) = 416.273 + -0.001 * AU
Correlation coefficient, r(F,AU) = -.002

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	173594.19	1	173594.19	0.012	2.708
Residual	31005202000.00	2181	14216049.00		
Total	31005377000.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is HF, with a mean value of -5.32.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: HF(hat) = a + b * AU
HF(hat) = -5.106 + -0.000 * AU
Correlation coefficient, r(HF,AU) = -.082

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	10447.13	1	10447.13	14.915	2.708
Residual	1527702.75	2181	700.46		
Total	1538149.88	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is FE, with a mean value of 3.60.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: FE(hat) = a + b * AU
FE(hat) = 3.621 + -0.000 * AU
Correlation coefficient, r(FE,AU) = -.033

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	151.21	1	151.21	2.362	2.708
Residual	139611.97	2181	64.01		
Total	139763.17	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is LA, with a mean value of 4.58.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: LA(hat) = a + b * AU
LA(hat) = 4.250 + 0.000 * AU
Correlation coefficient, r(LA,AU) = 0.031

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	26518.82	1	26518.82	2.089	2.708
Residual	27680284.00	2181	12691.56		
Total	27706802.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is PB, with a mean value of 1028.70.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.115
Regression equation: PB(hat) = a + b * AU
PB(hat) = 916.408 + 0.115 * AU
Correlation coefficient, r(PB,AU) = 0.201

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	2994611500.00	1	2994611500.00	91.380	2.708
Residual	71473414000.00	2181	32770938.00		
Total	74468024000.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is LU, with a mean value of 0.04.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: LU(hat) = a + b * AU
LU(hat) = 0.041 + -0.000 * AU
Correlation coefficient, r(LU,AU) = -.002

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	0.01	1	0.01	0.013	2.708
Residual	1619.87	2181	0.74		
Total	1619.88	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is MN, with a mean value of 1420.38.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.255
Regression equation: MN(hat) = a + b * AU
MN(hat) = 1670.133 + -0.255 * AU
Correlation coefficient, r(MN,AU) = -.232

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	14814188500.00	1	14814188500.00	123.562	2.708
Residual	%261486215000.00	2181	119892808.00		
Total	%276300400000.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is HG, with a mean value of 40.02.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: HG(hat) = a + b * AU
HG(hat) = 39.964 + 0.000 * AU
Correlation coefficient, r(HG,AU) = 0.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	795.43	1	795.43	0.014	2.708
Residual	121705768.00	2181	55802.74		
Total	121706560.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is MO, with a mean value of -32.82.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: MO(hat) = a + b * AU
MO(hat) = -32.459 + -0.000 * AU
Correlation coefficient, r(MO,AU) = -.011

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	30148.50	1	30148.50	0.266	2.708
Residual	246735504.00	2181	113129.53		
Total	246765648.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is NI, with a mean value of 0.16.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: NI(hat) = a + b * AU
NI(hat) = -0.023 + 0.000 * AU
Correlation coefficient, r(NI,AU) = 0.030

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	7547.96	1	7547.96	1.906	2.708
Residual	8638864.00	2181	3960.96		
Total	8646412.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is RB, with a mean value of 26.67.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: RB(hat) = a + b * AU
RB(hat) = 26.779 + -0.000 * AU
Correlation coefficient, r(RB,AU) = -.019

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	2825.10	1	2825.10	0.795	2.708
Residual	7751209.50	2181	3553.97		
Total	7754034.50	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is SM, with a mean value of 1.88.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: SM(hat) = a + b * AU
SM(hat) = 1.883 + -0.000 * AU
Correlation coefficient, r(SM,AU) = -.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	1.07	1	1.07	0.015	2.708
Residual	152772.14	2181	70.05		
Total	152773.20	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is SC, with a mean value of -1.53.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: SC(hat) = a + b * AU
SC(hat) = -1.436 + -0.000 * AU
Correlation coefficient, r(SC,AU) = -.061

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	2224.71	1	2224.71	8.197	2.708
Residual	591917.25	2181	271.40		
Total	594141.94	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is NA, with a mean value of 0.42.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: NA(hat) = a + b * AU
NA(hat) = 0.425 + -0.000 * AU
Correlation coefficient, r(NA,AU) = -.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	0.02	1	0.02	0.021	2.708
Residual	1953.39	2181	0.90		
Total	1953.41	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is TA, with a mean value of -12.35.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.001
Regression equation: TA(hat) = a + b * AU
TA(hat) = -13.431 + 0.001 * AU
Correlation coefficient, r(TA,AU) = 0.294

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	277226.66	1	277226.66	205.728	2.708
Residual	2938979.80	2181	1347.54		
Total	3216206.50	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is TB, with a mean value of 0.22.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: TB(hat) = a + b * AU
TB(hat) = 0.219 + -0.000 * AU
Correlation coefficient, r(TB,AU) = -.009

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	0.29	1	0.29	0.172	2.708
Residual	3750.38	2181	1.72		
Total	3750.68	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is TH, with a mean value of 6.62.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: TH(hat) = a + b * AU
TH(hat) = 6.663 + -0.000 * AU
Correlation coefficient, r(TH,AU) = -.006

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	540.05	1	540.05	0.074	2.708
Residual	15918836.00	2181	7298.87		
Total	15919376.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is W, with a mean value of -24.34.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: W(hat) = a + b * AU
W(hat) = -24.763 + 0.000 * AU
Correlation coefficient, r(W,AU) = 0.025

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	42078.75	1	42078.75	1.404	2.708
Residual	65365520.00	2181	29970.44		
Total	65407600.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is U, with a mean value of 4.45.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.001
Regression equation: U(hat) = a + b * AU
U(hat) = 5.053 + -0.001 * AU
Correlation coefficient, r(U,AU) = -.109

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	85363.91	1	85363.91	26.442	2.708
Residual	7041021.00	2181	3228.35		
Total	7126385.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is V, with a mean value of 12.84.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.000
Regression equation: V(hat) = a + b * AU
V(hat) = 12.817 + 0.000 * AU
Correlation coefficient, r(V,AU) = 0.005

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	153.50	1	153.50	0.049	2.708
Residual	6884883.00	2181	3156.76		
Total	6885036.50	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is YB, with a mean value of -0.44.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: YB(hat) = a + b * AU
YB(hat) = -0.430 + -0.000 * AU
Correlation coefficient, r(YB,AU) = -.022

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	16.81	1	16.81	1.029	2.708
Residual	35638.78	2181	16.34		
Total	35655.59	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is ZN, with a mean value of 811.09.
The number of observations is 2183 .

Slope (Regression coefficient) = 0.035
Regression equation: ZN(hat) = a + b * AU
ZN(hat) = 776.724 + 0.035 * AU
Correlation coefficient, r(ZN,AU) = 0.097

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	280444000.00	1	280444000.00	20.657	2.708
Residual	29609578000.00	2181	13576148.00		
Total	29890023000.00	2182			

Linear regression

The independent variable is AU, with a mean value of 979.68.
The dependent variable is ZR, with a mean value of -66.77.
The number of observations is 2183 .

Slope (Regression coefficient) = -0.000
Regression equation: ZR(hat) = a + b * AU
ZR(hat) = -66.593 + -0.000 * AU
Correlation coefficient, r(ZR,AU) = -.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(10.0%)
Regression	7242.58	1	7242.58	0.022	2.708
Residual	708654270.00	2181	324921.72		
Total	708661500.00	2182			

ANALYTICAL DATA FOR SAMPLES FROM THE UPPER PLATE
WEST-CENTRAL ARIZONA DETACHMENT TERRANE
APRIL 28, 1992

Variable	No. of Samples		Mean	Confidence Limit		Standard Deviation	Coef. of Variation
	Total	>DL*		Lower	Upper		
Au	1736	781	4385.58	3356.75	5414.42	14646.70	3.34
Ag	1736	233	39.85	27.92	51.78	92.40	2.32
Sb	1736	512	8.92	5.77	12.08	36.32	4.07
As	1736	519	95.33	59.50	131.16	415.48	4.36
Ba	1736	1222	6509.28	4747.37	8271.19	31392.95	4.82
Bi	1736	105	44.46	3.78	85.14	210.21	4.73
Br	1736	72	6.29	4.58	8.00	7.27	1.16
Cd	1736	82	42.33	18.34	66.32	109.18	2.58
Ce	1736	457	137.07	103.69	170.45	363.11	2.65
Cs	1736	285	3.74	3.19	4.28	4.70	1.26
Cr	1736	677	152.88	136.92	168.84	211.49	1.38
Co	1736	368	29.90	26.54	33.26	32.82	1.10
Cu	1736	611	2010.34	1609.27	2411.41	5047.98	2.51
Eu	1736	114	2.99	2.73	3.24	1.38	0.46
F	1736	186	3931.83	2192.06	5671.59	12026.53	3.06
Hf	1736	367	11.18	8.34	14.03	27.72	2.48
Fe	1736	830	5.62	5.09	6.15	7.79	1.39
La	1736	493	64.68	45.94	83.41	211.75	3.27
Pb	1736	897	2491.33	1908.96	3073.70	8886.92	3.57
Lu	1736	155	1.33	0.87	1.78	2.86	2.16
Mn	1736	572	5096.40	3327.84	6864.97	21534.80	4.23
Hg	1736	369	182.51	131.20	233.81	501.16	2.75
Mo	1736	359	78.06	-6.32	162.44	812.96	10.41
Ni	1736	294	81.31	66.26	96.36	131.14	1.61
Rb	1736	456	106.47	98.92	114.02	82.00	0.77
Sm	1736	356	10.50	8.63	12.38	17.98	1.71
Sc	1736	542	9.92	9.16	10.67	8.97	0.90
Na	1736	632	1.19	1.08	1.29	1.31	1.10
Ta	1736	179	2.11	1.48	2.75	4.29	2.03
Tb	1736	234	2.48	2.09	2.88	3.07	1.24
Th	1736	452	29.91	12.72	47.09	185.90	6.22
W	1736	457	94.21	63.54	124.89	333.69	3.54
U	1736	524	16.62	6.71	26.54	115.53	6.95
V	1736	225	83.77	66.87	100.68	128.66	1.54
Yb	1736	170	8.24	6.97	9.51	8.41	1.02
Zn	1736	1175	1511.54	1232.62	1790.46	4872.96	3.22
Zr	1736	201	678.64	471.19	886.09	1491.49	2.20

* > DL = Greater than detection limit

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Ag, with a mean value of 3.36.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.000
Regression equation: Ag(hat) = a + b * Au
Ag(hat) = 2.980 + 0.000 * Au
Correlation coefficient, r(Ag,Au) = 0.105

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	27346.24	1	27346.24	19.489	3.847
Residual	2433111.80	1734	1403.18		
Total	2460458.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Sb, with a mean value of -67.83.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.006
Regression equation: Sb(hat) = a + b * Au
Sb(hat) = -73.899 + 0.006 * Au
Correlation coefficient, r(Sb,Au) = 0.296

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	6892540.50	1	6892540.50	167.098	3.847
Residual	71524960.00	1734	41248.54		
Total	78417504.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is As, with a mean value of 13.86.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.003
Regression equation: As(hat) = a + b * Au
As(hat) = 11.091 + 0.003 * Au
Correlation coefficient, r(As,Au) = 0.109

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1429852.38	1	1429852.38	20.672	3.847
Residual	119938616.00	1734	69168.75		
Total	121368472.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Ba, with a mean value of 4554.12.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.315
Regression equation: Ba(hat) = a + b * Au
Ba(hat) = 4900.827 + -0.315 * Au
Correlation coefficient, r(Ba,Au) = -.136

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	22493454000.00	1	22493454000.00	32.595	3.847
Residual	%1196600460000.00	1734	690081020.00		
Total	%1219093860000.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Bi, with a mean value of -8.78.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.001
Regression equation: Bi(hat) = a + b * Au
Bi(hat) = -10.404 + 0.001 * Au
Correlation coefficient, r(Bi,Au) = 0.205

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	492794.25	1	492794.25	75.918	3.847
Residual	11255579.00	1734	6491.11		
Total	11748373.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Br, with a mean value of -0.87.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Br(hat) = a + b * Au
Br(hat) = -0.870 + -0.000 * Au
Correlation coefficient, r(Br,Au) = -.012

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2.10	1	2.10	0.242	3.847
Residual	15039.15	1734	8.67		
Total	15041.25	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Cd, with a mean value of -46.46.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.001
Regression equation: Cd(hat) = a + b * Au
Cd(hat) = -45.444 + -0.001 * Au
Correlation coefficient, r(Cd,Au) = -.082

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	193705.38	1	193705.38	11.677	3.847
Residual	28764482.00	1734	16588.51		
Total	28958188.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Ce, with a mean value of 34.90.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Ce(hat) = a + b * Au
Ce(hat) = 35.031 + -0.000 * Au
Correlation coefficient, r(Ce,Au) = -.007

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	3314.83	1	3314.83	0.086	3.847
Residual	66712732.00	1734	38473.32		
Total	66716048.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Cs, with a mean value of 0.32.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Cs(hat) = a + b * Au
Cs(hat) = 0.319 + -0.000 * Au
Correlation coefficient, r(Cs,Au) = -.005

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.52	1	0.52	0.040	3.847
Residual	22845.02	1734	13.17		
Total	22845.54	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Cr, with a mean value of 56.26.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.001
Regression equation: Cr(hat) = a + b * Au
Cr(hat) = 55.251 + 0.001 * Au
Correlation coefficient, r(Cr,Au) = 0.068

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	191521.97	1	191521.97	8.130	3.847
Residual	40850752.00	1734	23558.68		
Total	41042272.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Co, with a mean value of 2.19.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.000
Regression equation: Co(hat) = a + b * Au
Co(hat) = 2.102 + 0.000 * Au
Correlation coefficient, r(Co,Au) = 0.037

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1485.25	1	1485.25	2.411	3.847
Residual	1068351.62	1734	616.12		
Total	1069836.88	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Cu, with a mean value of 707.24.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.001
Regression equation: Cu(hat) = a + b * Au
Cu(hat) = 705.716 + 0.001 * Au
Correlation coefficient, r(Cu,Au) = 0.005

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%
Regression	434341.53	1	434341.53	0.044	3.847
Residual	17144696800.00	1734	9887368.00		
Total	17145131000.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Eu, with a mean value of -0.30.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Eu(hat) = a + b * Au
Eu(hat) = -0.298 + -0.000 * Au
Correlation coefficient, r(Eu,Au) = -.012

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.39	1	0.39	0.229	3.847
Residual	2948.54	1734	1.70		
Total	2948.93	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is F, with a mean value of 421.27.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.001
Regression equation: F(hat) = a + b * Au
F(hat) = 422.647 + -0.001 * Au
Correlation coefficient, r(F,Au) = -.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	356442.66	1	356442.66	0.021	3.847
Residual	29324886000.00	1734	16911698.00		
Total	29325242000.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Hf, with a mean value of -7.00.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Hf(hat) = a + b * Au
Hf(hat) = -6.770 + -0.000 * Au
Correlation coefficient, r(Hf,Au) = -.080

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	9736.53	1	9736.53	11.251	3.847
Residual	1500571.50	1734	865.38		
Total	1510308.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Fe, with a mean value of 2.68.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Fe(hat) = a + b * Au
Fe(hat) = 2.701 + -0.000 * Au
Correlation coefficient, r(Fe,Au) = -.031

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	62.90	1	62.90	1.707	3.847
Residual	63907.18	1734	36.86		
Total	63970.08	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is La, with a mean value of 3.44.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.000
Regression equation: La(hat) = a + b * Au
La(hat) = 3.059 + 0.000 * Au
Correlation coefficient, r(La,Au) = 0.032

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	27704.06	1	27704.06	1.746	3.847
Residual	27520822.00	1734	15871.29		
Total	27548526.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Pb, with a mean value of 1255.49.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.114
Regression equation: Pb(hat) = a + b * Au
Pb(hat) = 1129.822 + 0.114 * Au
Correlation coefficient, r(Pb,Au) = 0.200

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2955052500.00	1	2955052500.00	72.531	3.847
Residual	70646391000.00	1734	40741864.00		
Total	73601442000.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Lu, with a mean value of 0.06.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Lu(hat) = a + b * Au
Lu(hat) = 0.058 + -0.000 * Au
Correlation coefficient, r(Lu,Au) = -.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.01	1	0.01	0.011	3.847
Residual	1597.75	1734	0.92		
Total	1597.76	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Mn, with a mean value of 1679.23.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.258
Regression equation: Mn(hat) = a + b * Au
Mn(hat) = 1963.268 + -0.258 * Au
Correlation coefficient, r(Mn,Au) = -.234

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	15097074700.00	1	15097074700.00	100.816	3.847
Residual	%259664298000.00	1734	149748736.00		
Total	%274761367000.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Hg, with a mean value of 38.78.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Hg(hat) = a + b * Au
Hg(hat) = 38.801 + -0.000 * Au
Correlation coefficient, r(Hg,Au) = -.001

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	93.94	1	93.94	0.002	3.847
Residual	102106688.00	1734	58885.06		
Total	102106784.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Mo, with a mean value of -42.72.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Mo(hat) = a + b * Au
Mo(hat) = -42.365 + -0.000 * Au
Correlation coefficient, r(Mo,Au) = -.010

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	23960.24	1	23960.24	0.169	3.847
Residual	245751120.00	1734	141724.98		
Total	245775088.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Ni, with a mean value of 0.90.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.000
Regression equation: Ni(hat) = a + b * Au
Ni(hat) = 0.704 + 0.000 * Au
Correlation coefficient, r(Ni,Au) = 0.029

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	6934.29	1	6934.29	1.490	3.847
Residual	8069901.00	1734	4653.92		
Total	8076835.50	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Rb, with a mean value of 27.35.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Rb(hat) = a + b * Au
Rb(hat) = 27.467 + -0.000 * Au
Correlation coefficient, r(Rb,Au) = -.019

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2494.51	1	2494.51	0.623	3.847
Residual	6938375.50	1734	4001.37		
Total	6940870.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Sm, with a mean value of 2.11.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Sm(hat) = a + b * Au
Sm(hat) = 2.114 + -0.000 * Au
Correlation coefficient, r(Sm,Au) = -.004

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2.37	1	2.37	0.028	3.847
Residual	149063.45	1734	85.97		
Total	149065.83	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Sc, with a mean value of -2.65.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Sc(hat) = a + b * Au
Sc(hat) = -2.542 + -0.000 * Au
Correlation coefficient, r(Sc,Au) = -.059

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1994.74	1	1994.74	6.057	3.847
Residual	571022.88	1734	329.31		
Total	573017.62	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Na, with a mean value of 0.43.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Na(hat) = a + b * Au
Na(hat) = 0.428 + -0.000 * Au
Correlation coefficient, r(Na,Au) = -.001

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.00	1	0.00	0.002	3.847
Residual	1648.84	1734	0.95		
Total	1648.84	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Ta, with a mean value of -15.53.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.001
Regression equation: Ta(hat) = a + b * Au
Ta(hat) = -16.772 + 0.001 * Au
Correlation coefficient, r(Ta,Au) = 0.303

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	286953.81	1	286953.81	175.018	3.847
Residual	2843002.00	1734	1639.56		
Total	3129955.80	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Tb, with a mean value of 0.27.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Tb(hat) = a + b * Au
Tb(hat) = 0.267 + -0.000 * Au
Correlation coefficient, r(Tb,Au) = -.009

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.32	1	0.32	0.154	3.847
Residual	3629.96	1734	2.09		
Total	3630.29	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Th, with a mean value of 7.68.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Th(hat) = a + b * Au
Th(hat) = 7.735 + -0.000 * Au
Correlation coefficient, r(Th,Au) = -.006

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	629.23	1	629.23	0.069	3.847
Residual	15889717.00	1734	9163.62		
Total	15890346.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is W, with a mean value of -33.82.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.000
Regression equation: W(hat) = a + b * Au
W(hat) = -34.354 + 0.000 * Au
Correlation coefficient, r(W,Au) = 0.029

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	53389.81	1	53389.81	1.451	3.847
Residual	63814920.00	1734	36802.15		
Total	63868308.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is U, with a mean value of 4.93.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.001
Regression equation: U(hat) = a + b * Au
U(hat) = 5.612 + -0.001 * Au
Correlation coefficient, r(U,Au) = -.111

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	87920.42	1	87920.42	21.790	3.847
Residual	6996645.00	1734	4034.97		
Total	7084565.50	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is V, with a mean value of 9.48.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.000
Regression equation: V(hat) = a + b * Au
V(hat) = 9.441 + 0.000 * Au
Correlation coefficient, r(V,Au) = 0.006

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	218.33	1	218.33	0.072	3.847
Residual	5255340.50	1734	3030.76		
Total	5255559.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Yb, with a mean value of -0.27.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Yb(hat) = a + b * Au
Yb(hat) = -0.257 + -0.000 * Au
Correlation coefficient, r(Yb,Au) = -.025

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	20.29	1	20.29	1.084	3.847
Residual	32456.16	1734	18.72		
Total	32476.45	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Zn, with a mean value of 972.01.
The number of observations is 1736 .

Slope (Regression coefficient) = 0.034
Regression equation: Zn(hat) = a + b * Au
Zn(hat) = 934.232 + 0.034 * Au
Correlation coefficient, r(Zn,Au) = 0.096

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	267116720.00	1	267116720.00	16.155	3.847
Residual	28671089000.00	1734	16534653.00		
Total	28938205000.00	1735			

Linear regression

The independent variable is Au, with a mean value of 1098.90.
The dependent variable is Zr, with a mean value of -54.21.
The number of observations is 1736 .

Slope (Regression coefficient) = -0.000
Regression equation: Zr(hat) = a + b * Au
Zr(hat) = -53.950 + -0.000 * Au
Correlation coefficient, r(Zr,Au) = -.004

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	12434.03	1	12434.03	0.032	3.847
Residual	679853700.00	1734	392072.50		
Total	679866110.00	1735			

ANALYTICAL DATA FOR SAMPLES FROM THE LOWER PLATE
WEST-CENTRAL ARIZONA DETACHMENT TERRANE
APRIL 28, 1992

Variable	No. of Samples		Mean	Confidence Limit		Standard Deviation	Coef. of Variation
	Total	>DL*		Lower	Upper		
Au	447	243	982.48	643.96	1320.99	2678.84	2.73
Ag	447	81	6.17	2.43	9.92	16.92	2.74
Sb	447	169	3.82	1.95	5.69	12.34	3.23
As	447	215	20.49	11.33	29.66	68.14	3.33
Ba	447	218	3605.58	2036.69	5174.47	11752.64	3.26
Bi	447	42	30.24	0.29	60.19	96.12	3.18
Br	447	23	3.34	0.76	5.93	5.97	1.79
Cd	447	20	8.86	-1.46	19.17	22.03	2.49
Ce	447	139	53.68	46.05	61.31	45.49	0.85
Cs	447	60	1.50	1.28	1.73	0.87	0.58
Cr	447	156	94.82	79.53	110.11	96.66	1.02
Co	447	182	47.73	33.90	61.56	94.55	1.98
Cu	447	446	6298.03	5318.51	7277.55	10525.52	1.67
Eu	447	17	1.88	1.52	2.24	0.70	0.37
F	447	112	1567.30	885.05	2249.55	3643.66	2.32
Hf	447	131	4.85	4.31	5.39	3.13	0.65
Fe	447	236	13.53	11.70	15.37	14.34	1.06
La	447	182	24.41	21.50	27.32	19.90	0.82
Pb	447	163	406.58	159.52	653.65	1597.32	3.93
Lu	447	20	0.59	0.39	0.79	0.44	0.74
Mn	447	156	1189.45	824.04	1554.86	2310.39	1.94
Hg	447	110	182.92	108.72	257.12	392.65	2.15
Mo	447	191	13.66	9.83	17.49	26.82	1.96
Ni	447	100	39.28	30.63	47.93	43.59	1.11
Rb	447	168	64.45	57.30	71.61	46.98	0.73
Sm	447	93	4.79	3.94	5.64	4.13	0.86
Sc	447	203	6.16	5.38	6.94	5.63	0.91
Na	447	216	0.85	0.71	0.99	1.02	1.20
Ta	447	68	1.53	1.22	1.84	1.28	0.84
Tb	447	48	1.07	0.90	1.24	0.59	0.55
Th	447	166	6.75	5.30	8.20	9.43	1.40
W	447	133	44.44	33.04	55.84	66.46	1.50
U	447	184	8.97	7.33	10.62	11.30	1.26
V	447	150	77.27	64.46	90.07	79.35	1.03
Yb	447	30	4.23	3.51	4.95	1.92	0.45
Zn	447	92	1164.05	624.09	1704.01	2607.26	2.24
Zr	447	22	488.64	427.87	549.40	137.05	0.28

* > DL = Greater than detection limit

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Ag, with a mean value of -0.27.
The number of observations is 447 .

Slope (Regression coefficient) = 0.001
Regression equation: Ag(hat) = a + b * Au
Ag(hat) = -0.559 + 0.001 * Au
Correlation coefficient, r(Ag,Au) = 0.140

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	561.27	1	561.27	8.860	3.863
Residual	28190.66	445	63.35		
Total	28751.93	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Sb, with a mean value of 1.05.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Sb(hat) = a + b * Au
Sb(hat) = 1.086 + -0.000 * Au
Correlation coefficient, r(Sb,Au) = -.018

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	9.58	1	9.58	0.150	3.863
Residual	28452.20	445	63.94		
Total	28461.78	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is As, with a mean value of 9.70.
The number of observations is 447 .

Slope (Regression coefficient) = 0.001
Regression equation: As(hat) = a + b * Au
As(hat) = 9.086 + 0.001 * Au
Correlation coefficient, r(As,Au) = 0.050

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2653.95	1	2653.95	1.136	3.863
Residual	1039620.19	445	2336.23		
Total	1042274.12	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Ba, with a mean value of 1754.29.
The number of observations is 447 .

Slope (Regression coefficient) = -0.023
Regression equation: Ba(hat) = a + b * Au
Ba(hat) = 1765.976 + -0.023 * Au
Correlation coefficient, r(Ba,Au) = -.005

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	948225.00	1	948225.00	0.013	3.863
Residual	31430640000.00	445	70630648.00		
Total	31431588000.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Bi, with a mean value of 2.43.
The number of observations is 447 .

Slope (Regression coefficient) = 0.003
Regression equation: Bi(hat) = a + b * Au
Bi(hat) = 1.088 + 0.003 * Au
Correlation coefficient, r(Bi,Au) = 0.174

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	12537.99	1	12537.99	13.840	3.863
Residual	403147.66	445	905.95		
Total	415685.66	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Br, with a mean value of -0.88.
The number of observations is 447 .

Slope (Regression coefficient) = 0.000
Regression equation: Br(hat) = a + b * Au
Br(hat) = -0.957 + 0.000 * Au
Correlation coefficient, r(Br,Au) = 0.123

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	43.06	1	43.06	6.863	3.863
Residual	2792.34	445	6.27		
Total	2835.40	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Cd, with a mean value of -2.89.
The number of observations is 447 .

Slope (Regression coefficient) = 0.000
Regression equation: Cd(hat) = a + b * Au
Cd(hat) = -2.964 + 0.000 * Au
Correlation coefficient, r(Cd,Au) = 0.045

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	39.70	1	39.70	0.895	3.863
Residual	19732.56	445	44.34		
Total	19772.26	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Ce, with a mean value of 15.85.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Ce(hat) = a + b * Au
Ce(hat) = 16.004 + -0.000 * Au
Correlation coefficient, r(Ce,Au) = -.017

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	170.16	1	170.16	0.131	3.863
Residual	578247.44	445	1299.43		
Total	578417.62	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Cs, with a mean value of -0.02.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Cs(hat) = a + b * Au
Cs(hat) = -0.014 + -0.000 * Au
Correlation coefficient, r(Cs,Au) = -.044

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.51	1	0.51	0.852	3.863
Residual	268.78	445	0.60		
Total	269.29	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Cr, with a mean value of 24.98.
The number of observations is 447 .

Slope (Regression coefficient) = 0.003
Regression equation: Cr(hat) = a + b * Au
Cr(hat) = 23.382 + 0.003 * Au
Correlation coefficient, r(Cr,Au) = 0.080

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	17719.07	1	17719.07	2.887	3.863
Residual	2731451.80	445	6138.09		
Total	2749170.80	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Co, with a mean value of 18.30.
The number of observations is 447 .

Slope (Regression coefficient) = -0.002
Regression equation: Co(hat) = a + b * Au
Co(hat) = 19.325 + -0.002 * Au
Correlation coefficient, r(Co,Au) = -.062

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	7269.80	1	7269.80	1.720	3.863
Residual	1880604.50	445	4226.08		
Total	1887874.25	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Cu, with a mean value of 6283.94.
The number of observations is 447 .

Slope (Regression coefficient) = 0.692
Regression equation: Cu(hat) = a + b * Au
Cu(hat) = 5926.188 + 0.692 * Au
Correlation coefficient, r(Cu,Au) = 0.134

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	888260480.00	1	888260480.00	8.158	3.863
Residual	48451297000.00	445	108879320.00		
Total	49339556000.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Eu, with a mean value of -0.53.
The number of observations is 447 .

Slope (Regression coefficient) = 0.000
Regression equation: Eu(hat) = a + b * Au
Eu(hat) = -0.538 + 0.000 * Au
Correlation coefficient, r(Eu,Au) = 0.013

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.07	1	0.07	0.078	3.863
Residual	425.14	445	0.96		
Total	425.21	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is F, with a mean value of 392.70.
The number of observations is 447 .

Slope (Regression coefficient) = 0.043
Regression equation: F(hat) = a + b * Au
F(hat) = 370.676 + 0.043 * Au
Correlation coefficient, r(F,Au) = 0.045

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	3366850.80	1	3366850.80	0.894	3.863
Residual	1676481020.00	445	3767373.00		
Total	1679847940.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Hf, with a mean value of 1.21.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Hf(hat) = a + b * Au
Hf(hat) = 1.269 + -0.000 * Au
Correlation coefficient, r(Hf,Au) = -.072

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	20.18	1	20.18	2.334	3.863
Residual	3847.20	445	8.65		
Total	3867.38	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Fe, with a mean value of 7.14.
The number of observations is 447 .

Slope (Regression coefficient) = -0.001
Regression equation: Fe(hat) = a + b * Au
Fe(hat) = 7.472 + -0.001 * Au
Correlation coefficient, r(Fe,Au) = -.104

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	748.37	1	748.37	4.900	3.863
Residual	67969.81	445	152.74		
Total	68718.19	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is La, with a mean value of 9.01.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: La(hat) = a + b * Au
La(hat) = 9.073 + -0.000 * Au
Correlation coefficient, r(La,Au) = -.013

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	26.53	1	26.53	0.080	3.863
Residual	147310.41	445	331.03		
Total	147336.94	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Pb, with a mean value of 147.92.
The number of observations is 447 .

Slope (Regression coefficient) = 0.030
Regression equation: Pb(hat) = a + b * Au
Pb(hat) = 132.175 + 0.030 * Au
Correlation coefficient, r(Pb,Au) = 0.063

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1720558.88	1	1720558.88	1.786	3.863
Residual	428775650.00	445	963540.81		
Total	430496190.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Lu, with a mean value of -0.03.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Lu(hat) = a + b * Au
Lu(hat) = -0.024 + -0.000 * Au
Correlation coefficient, r(Lu,Au) = -.088

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.15	1	0.15	3.454	3.863
Residual	19.28	445	0.04		
Total	19.43	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Mn, with a mean value of 415.11.
The number of observations is 447 .

Slope (Regression coefficient) = 0.020
Regression equation: Mn(hat) = a + b * Au
Mn(hat) = 405.026 + 0.020 * Au
Correlation coefficient, r(Mn,Au) = 0.027

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	705725.50	1	705725.50	0.324	3.863
Residual	970351810.00	445	2180565.80		
Total	971057540.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Hg, with a mean value of 44.85.
The number of observations is 447 .

Slope (Regression coefficient) = 0.010
Regression equation: Hg(hat) = a + b * Au
Hg(hat) = 39.459 + 0.010 * Au
Correlation coefficient, r(Hg,Au) = 0.101

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	201693.91	1	201693.91	4.630	3.863
Residual	19385086.00	445	43561.99		
Total	19586780.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Mo, with a mean value of 5.66.
The number of observations is 447 .

Slope (Regression coefficient) = 0.000
Regression equation: Mo(hat) = a + b * Au
Mo(hat) = 5.470 + 0.000 * Au
Correlation coefficient, r(Mo,Au) = 0.041

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	263.55	1	263.55	0.743	3.863
Residual	157872.11	445	354.77		
Total	158135.66	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Ni, with a mean value of -2.72.
The number of observations is 447 .

Slope (Regression coefficient) = 0.001
Regression equation: Ni(hat) = a + b * Au
Ni(hat) = -3.040 + 0.001 * Au
Correlation coefficient, r(Ni,Au) = 0.035

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	708.75	1	708.75	0.559	3.863
Residual	564219.31	445	1267.91		
Total	564928.06	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Rb, with a mean value of 24.02.
The number of observations is 447 .

Slope (Regression coefficient) = -0.001
Regression equation: Rb(hat) = a + b * Au
Rb(hat) = 24.670 + -0.001 * Au
Correlation coefficient, r(Rb,Au) = -.060

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2914.38	1	2914.38	1.608	3.863
Residual	806309.38	445	1811.93		
Total	809223.75	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Sm, with a mean value of 0.99.
The number of observations is 447 .

Slope (Regression coefficient) = 0.000
Regression equation: Sm(hat) = a + b * Au
Sm(hat) = 0.990 + 0.000 * Au
Correlation coefficient, r(Sm,Au) = 0.003

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.03	1	0.03	0.004	3.863
Residual	3263.46	445	7.33		
Total	3263.49	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Sc, with a mean value of 2.79.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Sc(hat) = a + b * Au
Sc(hat) = 2.834 + -0.000 * Au
Correlation coefficient, r(Sc,Au) = -.037

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	14.43	1	14.43	0.605	3.863
Residual	10614.87	445	23.85		
Total	10629.30	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Na, with a mean value of 0.41.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Na(hat) = a + b * Au
Na(hat) = 0.423 + -0.000 * Au
Correlation coefficient, r(Na,Au) = -.063

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1.21	1	1.21	1.779	3.863
Residual	303.23	445	0.68		
Total	304.44	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Ta, with a mean value of 0.01.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Ta(hat) = a + b * Au
Ta(hat) = 0.023 + -0.000 * Au
Correlation coefficient, r(Ta,Au) = -.056

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1.13	1	1.13	1.393	3.863
Residual	359.50	445	0.81		
Total	360.63	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Tb, with a mean value of 0.03.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Tb(hat) = a + b * Au
Tb(hat) = 0.041 + -0.000 * Au
Correlation coefficient, r(Tb,Au) = -.087

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.76	1	0.76	3.398	3.863
Residual	100.07	445	0.22		
Total	100.83	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Th, with a mean value of 2.49.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Th(hat) = a + b * Au
Th(hat) = 2.559 + -0.000 * Au
Correlation coefficient, r(Th,Au) = -.041

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	32.19	1	32.19	0.737	3.863
Residual	19444.71	445	43.70		
Total	19476.90	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is W, with a mean value of 12.47.
The number of observations is 447 .

Slope (Regression coefficient) = -0.001
Regression equation: W(hat) = a + b * Au
W(hat) = 13.115 + -0.001 * Au
Correlation coefficient, r(W,Au) = -.061

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2909.56	1	2909.56	1.671	3.863
Residual	774769.69	445	1741.06		
Total	777679.25	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is U, with a mean value of 2.62.
The number of observations is 447 .

Slope (Regression coefficient) = 0.001
Regression equation: U(hat) = a + b * Au
U(hat) = 2.343 + 0.001 * Au
Correlation coefficient, r(U,Au) = 0.114

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	519.92	1	519.92	5.871	3.863
Residual	39406.62	445	88.55		
Total	39926.54	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is V, with a mean value of 25.92.
The number of observations is 447 .

Slope (Regression coefficient) = 0.001
Regression equation: V(hat) = a + b * Au
V(hat) = 25.277 + 0.001 * Au
Correlation coefficient, r(V,Au) = 0.043

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2842.15	1	2842.15	0.826	3.863
Residual	1530537.88	445	3439.41		
Total	1533380.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Yb, with a mean value of -1.10.
The number of observations is 447 .

Slope (Regression coefficient) = 0.000
Regression equation: Yb(hat) = a + b * Au
Yb(hat) = -1.106 + 0.000 * Au
Correlation coefficient, r(Yb,Au) = 0.005

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.07	1	0.07	0.010	3.863
Residual	2931.20	445	6.59		
Total	2931.27	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Zn, with a mean value of 186.10.
The number of observations is 447 .

Slope (Regression coefficient) = 0.034
Regression equation: Zn(hat) = a + b * Au
Zn(hat) = 168.397 + 0.034 * Au
Correlation coefficient, r(Zn,Au) = 0.054

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2174333.50	1	2174333.50	1.325	3.863
Residual	729996220.00	445	1640441.00		
Total	732170560.00	446			

Linear regression

The independent variable is Au, with a mean value of 516.63.
The dependent variable is Zr, with a mean value of -115.55.
The number of observations is 447 .

Slope (Regression coefficient) = -0.000
Regression equation: Zr(hat) = a + b * Au
Zr(hat) = -115.459 + -0.000 * Au
Correlation coefficient, r(Zr,Au) = -.001

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	55.47	1	55.47	0.001	3.863
Residual	27459184.00	445	61706.03		
Total	27459240.00	446			

GEOCHEMICAL MODEL OF DETACHMENT-RELATED GOLD DEPOSITS
(FROM MODEL.DBF)
APRIL 28, 1991

Variable	No. of Samples		Mean	Confidence Limit		Standard Deviation	Coef. of Variation
	Total	>DL*		Lower	Upper		
Au	23	23	2678.35	-306.49	5663.18	6902.29	2.58
Ag	23	2	7.00	-29.10	43.10	4.24	0.61
Sb	23	23	10.40	4.62	16.19	13.38	1.29
As	23	23	46.21	15.48	76.94	71.07	1.54
Ba	23	23	4694.36	1236.91	8151.81	7995.19	1.70
Bi	23	4	11.75	-6.27	29.77	11.32	0.96
Br	23	9	4.52	-0.94	9.98	7.11	1.57
Cd	23	1					
Ce	23	23	76.52	63.55	89.49	30.00	0.39
Cs	23	22	6.38	4.21	8.56	4.90	0.77
Cr	23	22	119.14	96.30	141.98	51.51	0.43
Co	23	20	12.20	10.49	13.91	3.65	0.30
Cu	23	23	1739.39	-670.30	4149.08	5572.29	3.20
Eu	23	6	1.17	0.74	1.60	0.41	0.35
F	23	22	703.68	546.05	861.32	355.53	0.51
Hf	23	21	4.86	4.03	5.69	1.82	0.38
Fe	23	23	6.33	4.48	8.17	4.27	0.67
La	23	23	36.30	31.93	40.68	10.11	0.28
Pb	23	23	16.83	9.47	24.18	17.02	1.01
Lu	23	11	0.36	0.29	0.43	0.10	0.28
Mn	23	21	1925.53	632.39	3218.66	2840.78	1.48
Hg	23	21	680.24	-126.64	1487.11	1772.56	2.61
Mo	23	13	14.08	4.26	23.90	16.25	1.15
Ni	23	6	26.17	22.57	29.77	3.43	0.13
Rb	23	23	139.30	108.94	169.67	70.22	0.50
Sm	23	23	6.11	5.11	7.11	2.32	0.38
Sc	23	23	8.72	7.27	10.16	3.34	0.38
Na	23	23	1.76	1.27	2.24	1.12	0.64
Ta	23	19	1.11	0.94	1.29	0.36	0.33
Tb	23	15	1.22	0.76	1.68	0.84	0.68
Th	23	23	15.39	12.05	18.72	7.71	0.50
W	23	21	48.29	23.34	73.24	54.81	1.14
U	23	23	9.44	4.90	13.97	10.49	1.11
V	23	22	62.91	50.10	75.72	28.89	0.46
Yb	23	7	3.29	2.83	3.74	0.49	0.15
Zn	23	12	224.17	87.66	360.67	214.83	0.96
Zr	23	5	448.00	314.44	581.56	107.56	0.24

* > DL = Greater than detection limit

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Ag, with a mean value of 0.61.
The number of observations is 23 .

Slope (Regression coefficient) = 0.000
Regression equation: Ag(hat) = a + b * Au
Ag(hat) = 0.441 + 0.000 * Au
Correlation coefficient, r(Ag,Au) = 0.195

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	4.10	1	4.10	0.832	4.325
Residual	103.38	21	4.92		
Total	107.48	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Sb, with a mean value of 10.40.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Sb(hat) = a + b * Au
Sb(hat) = 10.810 + -0.000 * Au
Correlation coefficient, r(Sb,Au) = -.078

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	24.02	1	24.02	0.129	4.325
Residual	3917.09	21	186.53		
Total	3941.11	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is As, with a mean value of 46.21.
The number of observations is 23 .

Slope (Regression coefficient) = -0.001
Regression equation: As(hat) = a + b * Au
As(hat) = 49.099 + -0.001 * Au
Correlation coefficient, r(As,Au) = -.105

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1220.68	1	1220.68	0.233	4.325
Residual	109888.56	21	5232.79		
Total	111109.23	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Ba, with a mean value of 4694.35.
The number of observations is 23 .

Slope (Regression coefficient) = 0.201
Regression equation: Ba(hat) = a + b * Au
Ba(hat) = 4156.367 + 0.201 * Au
Correlation coefficient, r(Ba,Au) = 0.173

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	42287264.00	1	42287264.00	0.651	4.325
Residual	1364008060.00	21	64952764.00		
Total	1406295300.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Bi, with a mean value of 2.04.
The number of observations is 23 .

Slope (Regression coefficient) = 0.001
Regression equation: Bi(hat) = a + b * Au
Bi(hat) = 0.368 + 0.001 * Au
Correlation coefficient, r(Bi,Au) = 0.698

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	410.06	1	410.06	19.985	4.325
Residual	430.89	21	20.52		
Total	840.96	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Br, with a mean value of 1.77.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Br(hat) = a + b * Au
Br(hat) = 1.986 + -0.000 * Au
Correlation coefficient, r(Br,Au) = -.115

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	6.82	1	6.82	0.281	4.325
Residual	509.23	21	24.25		
Total	516.05	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Cd, with a mean value of 0.30.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Cd(hat) = a + b * Au
Cd(hat) = 0.333 + -0.000 * Au
Correlation coefficient, r(Cd,Au) = -.051

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.12	1	0.12	0.054	4.325
Residual	46.75	21	2.23		
Total	46.87	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Ce, with a mean value of 76.52.
The number of observations is 23 .

Slope (Regression coefficient) = -0.001
Regression equation: Ce(hat) = a + b * Au
Ce(hat) = 79.555 + -0.001 * Au
Correlation coefficient, r(Ce,Au) = -.261

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1344.18	1	1344.18	1.530	4.325
Residual	18451.56	21	878.65		
Total	19795.73	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Cs, with a mean value of 6.10.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Cs(hat) = a + b * Au
Cs(hat) = 6.415 + -0.000 * Au
Correlation coefficient, r(Cs,Au) = -.161

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	14.11	1	14.11	0.559	4.325
Residual	530.04	21	25.24		
Total	544.15	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Cr, with a mean value of 113.96.
The number of observations is 23 .

Slope (Regression coefficient) = 0.002
Regression equation: Cr(hat) = a + b * Au
Cr(hat) = 107.396 + 0.002 * Au
Correlation coefficient, r(Cr,Au) = 0.301

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	6288.12	1	6288.12	2.096	4.325
Residual	63014.85	21	3000.71		
Total	69302.97	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Co, with a mean value of 10.61.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Co(hat) = a + b * Au
Co(hat) = 10.647 + -0.000 * Au
Correlation coefficient, r(Co,Au) = -.018

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.22	1	0.22	0.007	4.325
Residual	641.26	21	30.54		
Total	641.48	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Cu, with a mean value of 1739.39.
The number of observations is 23 .

Slope (Regression coefficient) = 0.765
Regression equation: Cu(hat) = a + b * Au
Cu(hat) = -309.654 + 0.765 * Au
Correlation coefficient, r(Cu,Au) = 0.948

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	613449150.00	1	613449150.00	184.933	4.325
Residual	69659904.00	21	3317138.20		
Total	683109060.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Eu, with a mean value of 0.30.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Eu(hat) = a + b * Au
Eu(hat) = 0.331 + -0.000 * Au
Correlation coefficient, r(Eu,Au) = -.123

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.10	1	0.10	0.323	4.325
Residual	6.77	21	0.32		
Total	6.87	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is F, with a mean value of 673.09.
The number of observations is 23 .

Slope (Regression coefficient) = -0.006
Regression equation: F(hat) = a + b * Au
F(hat) = 688.834 + -0.006 * Au
Correlation coefficient, r(F,Au) = -.108

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	36229.15	1	36229.15	0.246	4.325
Residual	3091772.80	21	147227.28		
Total	3128002.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Hf, with a mean value of 4.43.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Hf(hat) = a + b * Au
Hf(hat) = 4.809 + -0.000 * Au
Correlation coefficient, r(Hf,Au) = -.432

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	20.44	1	20.44	4.810	4.325
Residual	89.22	21	4.25		
Total	109.65	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Fe, with a mean value of 6.30.
The number of observations is 23 .

Slope (Regression coefficient) = 0.000
Regression equation: Fe(hat) = a + b * Au
Fe(hat) = 5.958 + 0.000 * Au
Correlation coefficient, r(Fe,Au) = 0.210

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	17.53	1	17.53	0.971	4.325
Residual	379.12	21	18.05		
Total	396.65	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is La, with a mean value of 36.30.
The number of observations is 23 .

Slope (Regression coefficient) = -0.001
Regression equation: La(hat) = a + b * Au
La(hat) = 38.146 + -0.001 * Au
Correlation coefficient, r(La,Au) = -.469

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	495.53	1	495.53	5.935	4.325
Residual	1753.34	21	83.49		
Total	2248.87	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Pb, with a mean value of 16.83.
The number of observations is 23 .

Slope (Regression coefficient) = 0.000
Regression equation: Pb(hat) = a + b * Au
Pb(hat) = 16.667 + 0.000 * Au
Correlation coefficient, r(Pb,Au) = 0.024

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	3.70	1	3.70	0.012	4.325
Residual	6365.61	21	303.12		
Total	6369.30	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Lu, with a mean value of 0.17.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Lu(hat) = a + b * Au
Lu(hat) = 0.192 + -0.000 * Au
Correlation coefficient, r(Lu,Au) = -.232

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.05	1	0.05	1.193	4.325
Residual	0.82	21	0.04		
Total	0.86	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Mn, with a mean value of 1758.09.
The number of observations is 23 .

Slope (Regression coefficient) = 0.118
Regression equation: Mn(hat) = a + b * Au
Mn(hat) = 1442.825 + 0.118 * Au
Correlation coefficient, r(Mn,Au) = 0.294

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	14521708.00	1	14521708.00	1.985	4.325
Residual	153647856.00	21	7316564.50		
Total	168169568.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Hg, with a mean value of 621.09.
The number of observations is 23 .

Slope (Regression coefficient) = -0.022
Regression equation: Hg(hat) = a + b * Au
Hg(hat) = 678.949 + -0.022 * Au
Correlation coefficient, r(Hg,Au) = -.088

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	489181.41	1	489181.41	0.163	4.325
Residual	63194944.00	21	3009283.00		
Total	63684124.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Mo, with a mean value of 7.96.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Mo(hat) = a + b * Au
Mo(hat) = 8.084 + -0.000 * Au
Correlation coefficient, r(Mo,Au) = -.024

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2.38	1	2.38	0.012	4.325
Residual	4286.58	21	204.12		
Total	4288.96	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Ni, with a mean value of 6.83.
The number of observations is 23 .

Slope (Regression coefficient) = 0.001
Regression equation: Ni(hat) = a + b * Au
Ni(hat) = 5.227 + 0.001 * Au
Correlation coefficient, r(Ni,Au) = 0.347

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	373.68	1	373.68	2.883	4.325
Residual	2721.63	21	129.60		
Total	3095.30	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Rb, with a mean value of 139.30.
The number of observations is 23 .

Slope (Regression coefficient) = -0.003
Regression equation: Rb(hat) = a + b * Au
Rb(hat) = 148.155 + -0.003 * Au
Correlation coefficient, r(Rb,Au) = -.325

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	11445.11	1	11445.11	2.477	4.325
Residual	97025.76	21	4620.27		
Total	108470.88	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Sm, with a mean value of 6.11.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Sm(hat) = a + b * Au
Sm(hat) = 6.435 + -0.000 * Au
Correlation coefficient, r(Sm,Au) = -.363

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	15.53	1	15.53	3.184	4.325
Residual	102.43	21	4.88		
Total	117.96	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Sc, with a mean value of 8.72.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Sc(hat) = a + b * Au
Sc(hat) = 9.276 + -0.000 * Au
Correlation coefficient, r(Sc,Au) = -.431

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	45.51	1	45.51	4.780	4.325
Residual	199.96	21	9.52		
Total	245.47	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Na, with a mean value of 1.76.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Na(hat) = a + b * Au
Na(hat) = 1.926 + -0.000 * Au
Correlation coefficient, r(Na,Au) = -.383

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	4.07	1	4.07	3.613	4.325
Residual	23.64	21	1.13		
Total	27.71	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Ta, with a mean value of 0.92.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Ta(hat) = a + b * Au
Ta(hat) = 0.942 + -0.000 * Au
Correlation coefficient, r(Ta,Au) = -.118

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.09	1	0.09	0.296	4.325
Residual	6.36	21	0.30		
Total	6.45	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Tb, with a mean value of 0.80.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Tb(hat) = a + b * Au
Tb(hat) = 0.876 + -0.000 * Au
Correlation coefficient, r(Tb,Au) = -.233

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	0.95	1	0.95	1.204	4.325
Residual	16.58	21	0.79		
Total	17.53	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Th, with a mean value of 15.39.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Th(hat) = a + b * Au
Th(hat) = 16.447 + -0.000 * Au
Correlation coefficient, r(Th,Au) = -.354

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	164.20	1	164.20	3.013	4.325
Residual	1144.25	21	54.49		
Total	1308.45	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is W, with a mean value of 44.09.
The number of observations is 23 .

Slope (Regression coefficient) = 0.001
Regression equation: W(hat) = a + b * Au
W(hat) = 42.327 + 0.001 * Au
Correlation coefficient, r(W,Au) = 0.084

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	452.34	1	452.34	0.149	4.325
Residual	63891.48	21	3042.45		
Total	64343.82	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is U, with a mean value of 9.44.
The number of observations is 23 .

Slope (Regression coefficient) = 0.001
Regression equation: U(hat) = a + b * Au
U(hat) = 6.072 + 0.001 * Au
Correlation coefficient, r(U,Au) = 0.828

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1656.45	1	1656.45	45.642	4.325
Residual	762.13	21	36.29		
Total	2418.58	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is V, with a mean value of 60.17.
The number of observations is 23 .

Slope (Regression coefficient) = -0.001
Regression equation: V(hat) = a + b * Au
V(hat) = 63.444 + -0.001 * Au
Correlation coefficient, r(V,Au) = -.271

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	1562.23	1	1562.23	1.661	4.325
Residual	19747.07	21	940.34		
Total	21309.30	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Yb, with a mean value of 1.00.
The number of observations is 23 .

Slope (Regression coefficient) = -0.000
Regression equation: Yb(hat) = a + b * Au
Yb(hat) = 1.123 + -0.000 * Au
Correlation coefficient, r(Yb,Au) = -.203

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	2.22	1	2.22	0.899	4.325
Residual	51.78	21	2.47		
Total	54.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Zn, with a mean value of 116.96.
The number of observations is 23 .

Slope (Regression coefficient) = -0.004
Regression equation: Zn(hat) = a + b * Au
Zn(hat) = 128.164 + -0.004 * Au
Correlation coefficient, r(Zn,Au) = -.152

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	18351.99	1	18351.99	0.496	4.325
Residual	777735.00	21	37035.00		
Total	796087.00	22			

Linear regression

The independent variable is Au, with a mean value of 2678.35.
The dependent variable is Zr, with a mean value of 97.39.
The number of observations is 23 .

Slope (Regression coefficient) = -0.003
Regression equation: Zr(hat) = a + b * Au
Zr(hat) = 105.963 + -0.003 * Au
Correlation coefficient, r(Zr,Au) = -.114

Analysis of variance

Source of variation	Sum of squares	d.f.	Mean square	F	F(5.0%)
Regression	10735.95	1	10735.95	0.275	4.325
Residual	820907.56	21	39090.84		
Total	831643.50	22			